SURPLUS

P. O. No. — 88A-42345-32
REQUISITION No. — MIPR 40-604-7-50Q-180
CONTRACT No. — DA-ENG-11-184-57-A-348
SPECIFICATION No. — SIZE 4

TRACTOR SERIAL Nos. — 49 042-714; 50 419-714 Thru 50 539-714 Inclusive

USAF REGISTRATION Nos. — 57D73 Thru 57D194 Inclusive

Applicable Specifications

MIL-T-3229
MIL-E-11275B
MIL-G-3056A
F-F-351A
MS 35341-2-3-4-5-6-7
MIL-B-11188A
MIL-E-4454 w/Amend 3
MIL-O-4339
MIL-T-704C
TT-E-489B
TT-C-595
MIL-I-0011683B
MIL-STD-130
MIL-STD-129A
O-E-771A
MIL-P-207A

PARTS BOOK AND INSTRUCTION MANUAL

MILITARY INDUSTRIAL SUPER 77 HC TRACTOR

The OLIVER Corporation
CHARLES CITY, IOWA

MANUFACTURER'S BOOK No. S1-M-M12

MAY 20, 1957

U. S. AIR FORCE

INTRODUCTION

"This Material Is Furnished For Use By Or For The United States Government Only For The Following Purposes: (A) Preparation Of Department Of The Arm Supply And Technical Publications, (B) Preparation Of Federal Item Descriptions, (C) Computation Of Parts Requirements, And (D) Procurement Of Parts From The Contractor Or The Originator, And Shall Not Be Duplicated, Used Or Disclosed For Manufacturing And Item(s) Shown Herein Without Permission Of The Contractor. This Legend Shall Be Included On Any Duplication Hereof In Whole Or In Part."

This Parts Book contains a complete list of parts of the Military Industrial Super 77 Tractor.

The Book is divided into twelve sections. (See Table of Contents, page II.) Each section is subdivided into groups or units to simplify the listing of the parts. Each group or unit of parts is illustrated by an "exploded view" which shows the position of each part in relationship to the other parts. In each group, part numbers and reference numbers are listed in numerical order. A complete description of the part and the quantity used are shown opposite the part number. Because we use a Standardized Military Engine supplied by the Waukesha Motor Company we are listing their part numbers along with the Oliver part numbers that are available.

We do not breakdown the accessory units such as the starting motor, distributor, oil filter, etc. but we do show the Vendors part number immediately following the description.

A numerical index is given at the back of the book.

Each part is described by its function in the group in which it is listed. The basic part name is in bold type followed by the description. "S" or 900 000 number hardware parts are listed in the column under the tractor parts with which they are used.

The total number of parts used per tractor is shown opposite each part number and also the total number of "S" or 900 000 hardware parts used with parts is shown.

When ordering repairs, always give the serial number of the tractor. If parts for the carburetor, distributor, generator, starting motor or any unit assembly with a model number or serial number are ordered, give the model number and serial number. The part number and descriptive name of each part ordered should be given. Specify whether shipments are to be forwarded by freight, express or parcel post.

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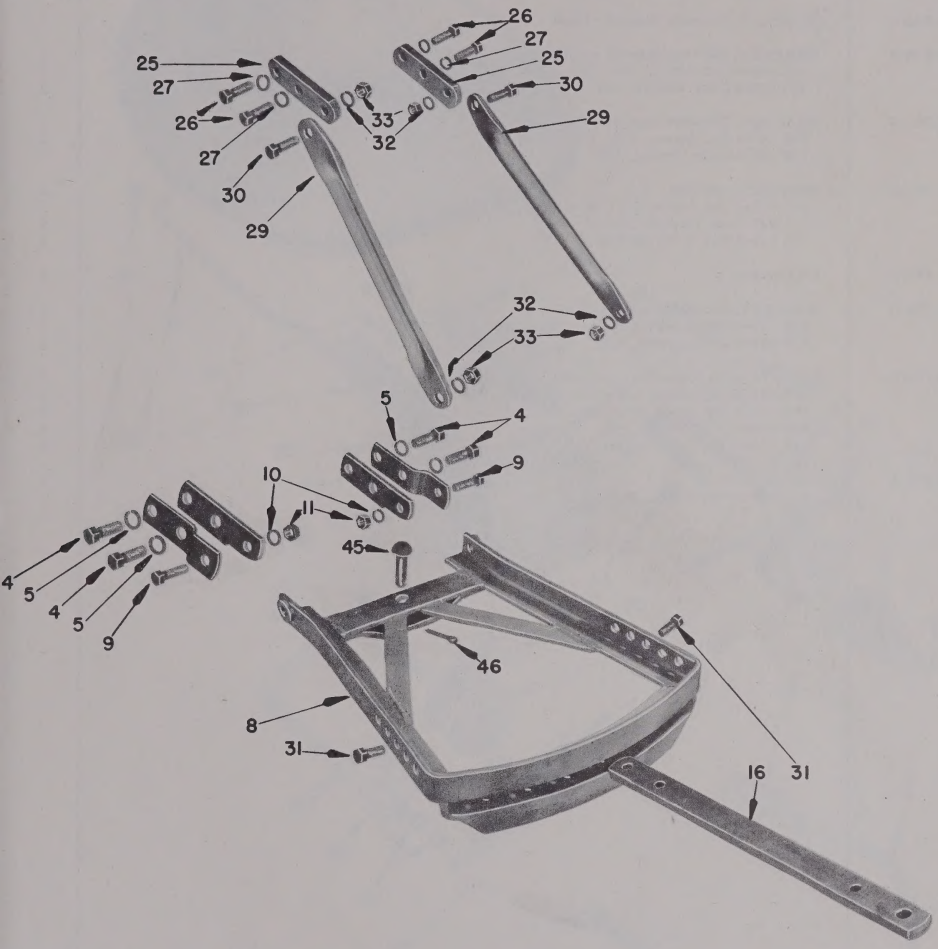
DRAWBAR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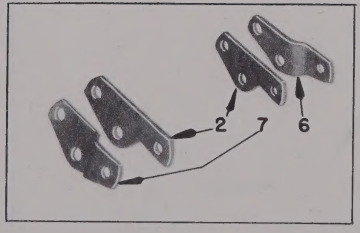
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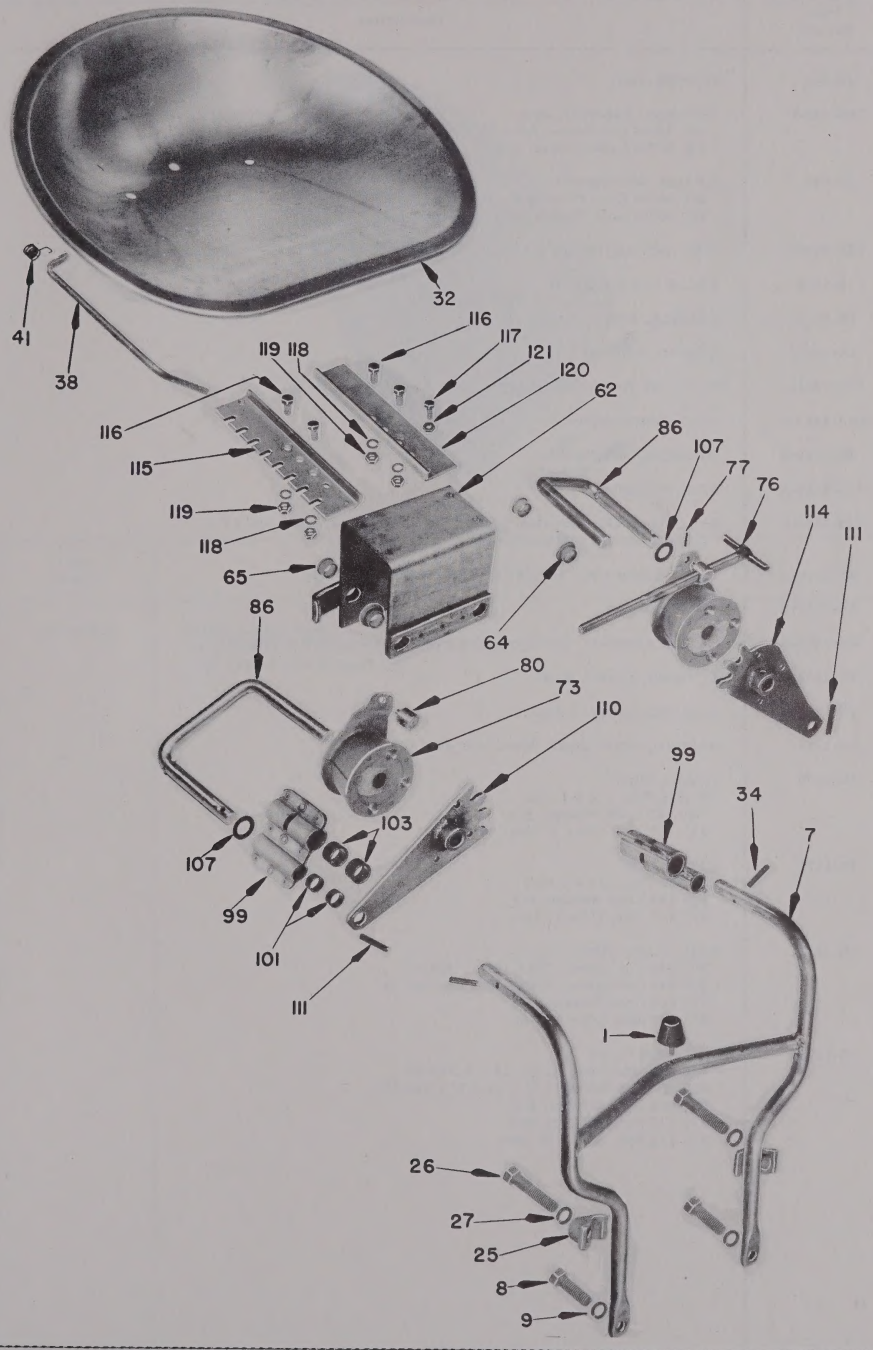
DRAWBAR

Ref. No.	Part Number	Description	No. Req.
2	1K-785-A	BRACKET, Drawbar Support - Inner	2
6	1K-786-A	BRACKET, Drawbar Support - Outer Right	1
4		908 401-4 Cap Screw, 3/4 - 10 x 2 Hex Hd	2
5		920 089-4 Lock Washer, 3/4	2
7	1K-786-B	BRACKET, Drawbar Support - Outer Left	1
4		908 401-4 Cap Screw, 3/4 - 10 x 2 Hex Hd	2
5		920 089-4 Lock Washer, 3/4	2
8	100 496-A	SUPPORT, Drawbar	1
9		908 535-4 Cap Screw, 5/8 - 18 x 2 Hex Hd	2
10		920 087 Lock Washer, 5/8	2
11		915 006-4 Nut, 5/8 - 18 Hex	2
16	100 498-A	DRAWBAR	1
25	1B-794-B	BRACKET, Drawbar Upper Support	2
26		908 385-4 Cap Screw, 5/8 - 11 x 1-3/4 Hex Hd	4
27		920 087-4 Lock Washer, 5/8	4
29	1B-795-E	LINK, Drawbar Adjusting (17-3/4" Long Overall)	2
30		908 534-4 Cap Screw, 5/8 - 18 x 1-3/4 Hex Hd	2
31		908 533-4 Cap Screw, 5/8 - 18 x 1-1/2 Hex Hd	2
32		920 087-4 Lock Washer, 5/8	4
33		915 006-4 Nut, 5/8 - 18 Hex	4
45	1B-800-A	PIN, Drawbar	1
46		932 056 Cotter Pin, 5/16 x 1-1/2	1

SEAT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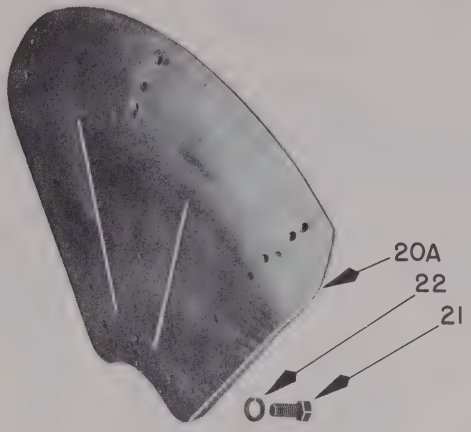
SEAT

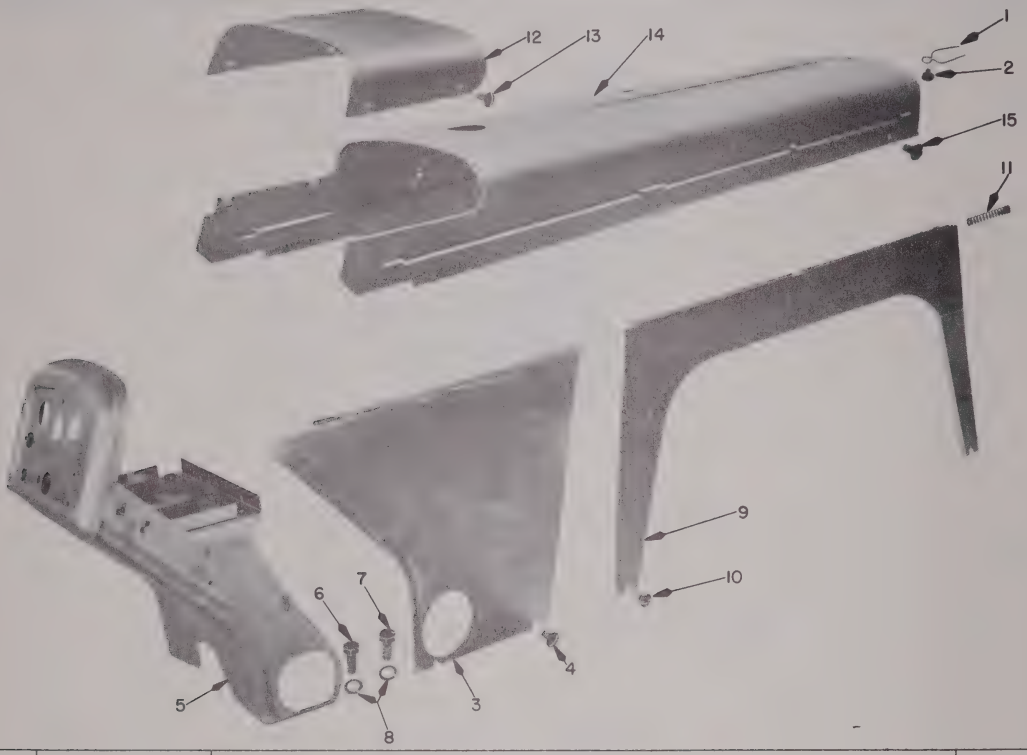
Ref. No.	Part Number	Description	No. Req.
1	1K-942	BUMPER, Seat	1
7	1KS-943-E	SUPPORT Assembly, Seat	1
8		908 385-4 Cap Screw, 5/8 - 11 x 1-3/4 Hex Hd	2
9		920 087-4 Lock Washer, 5/8	2
25	1H-948	CLAMP, Seat Support	2
26		908 388-4 Cap Screw, 5/8 - 11 x 2-1/2 Hex Hd	2
27		920 087-4 Lock Washer, 5/8	2
32	1KS-949-D	PAN AND ADJUSTER HANDLE Assembly, Seat	1
34	S-1375	PIN, 5/16 x 1-1/2 Roll	2
38	1K-952-B	HANDLE, Seat Adjuster	1
41	1K-954-A	SPRING, Adjuster	1
62	1KS-1851-A	SUPPORT Assembly, Seat (Includes 1K-1852-B Bushing)	1
	1KSA-1851-A	SUSPENSION Assembly	1
64-65	1K-1852-B	BUSHING, Seat Support	4
73	1K-1854-A	SPRING, Rubber	2
76	1KS-1855-B	STUD Assembly, Adjuster (This includes Callouts 76, 80 and 81)	1
77		S-1381 Pin, 1/8 x 3/4 Roll	1
80	1K-1856-A	PIN, Adjuster - RH (Order 1KS-1355-B Stud with Pins)	1
86	1K-1857-B	SHAFT, Spring	2
99	1KS-1860-B	LEVER Assembly (Includes 1K-1861-A and 1K-1862-B Bushings)	2
101	1K-1861-A	BUSHING, Lever - Small	4
103	1K-1862-B	BUSHING, Lever - Large	4
107	1K-1865	WASHER, Spring Shaft (Used with 1K-1857-B)	2
110	1K-1870	GEAR - Right	1
111		S-1380 Pin, 1/4 x 1 Roll	1
112		920 087 Lock Washer, 5/8	1
113		915 117 Nut, 5/8 - 11 Hex	1
114	1K-1871	GEAR - Left	1
111		S-1380 Pin, 1/4 x 1 Roll	1
112		920 087 Lock Washer, 5/8	1
113		915 117 Nut, 5/8 - 11 Hex	1
115	1K-1872	RAIL, Slide - Right	1
116		908 332 Cap Screw, 3/8 - 16 x 1 Hex Hd	2
117		908 315 Cap Screw, 5/16 - 18 x 3/4 Hex Hd	1
118		920 083 Lock Washer, 3/8	2
121		915 113 Nut, 3/8 - 16 Hex	2
120	1K-1873	RAIL, Slide - Left	1
116		908 332 Cap Screw, 3/8 - 16 x 1 Hex Hd	2
117		908 315 Cap Screw, 5/16 - 18 x 3/4 Hex Hd	1
118		920 083 Lock Washer, 3/8	2
119		915 113 Nut, 3/8 / 16 Hex	2
121		915 112 Nut, 5/16 - 18 Hex	1

WHEEL GUARDS



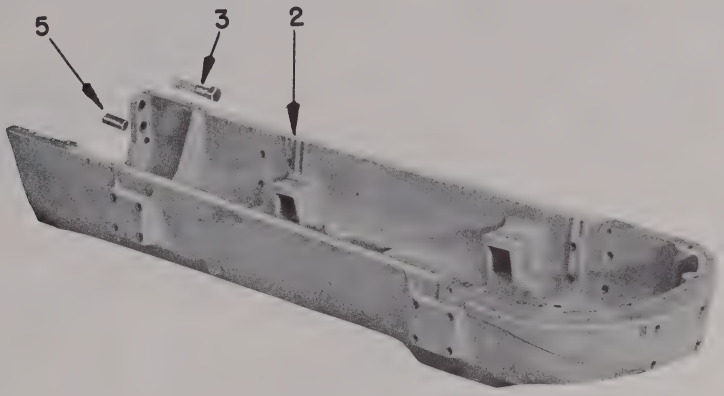
Ref. No.	Part Number	Description	No. Req.
20A	1KS-860-A	GUARD, Rear Wheel	2
21		908 355-4 Cap Screw, 1/2 - 13 x 1 Hex Hd	12
22		920 085-4 Lock Washer, 1/2	12

HOOD, SIDE PANEL AND REAR PANEL



Ref. No.	Part Number	Description	No. Req.
1	1B-809-A	SPRING, Hood Bar Latch	1
2		923 216 Rivet, 3/16 x 1/4 Wagon Box Hd	1
3	1MS-1015	DOOR, Clutch Compartment - Right (Has Hole) (Includes Spring)	1
4		S-2559-4 Fastener, 5/16 - 18 x 1/2 Sems	4
3	1MS-1016	DOOR, Clutch Compartment - Left (No Hole) (Includes Spring)	1
4		S-2559-4 Fastener, 5/16 - 18 x 1/2 Sems	4
5	1MS-1372-N	PANEL Assembly, Rear	1
6		908 331-4 Cap Screw, 3/8 - 16 x 7/8 Hex Hd	3
7		908 330-4 Cap Screw, 3/8 - 16 x 3/4 Hex Hd	1
8		920 083 Lock Washer, 3/8	4
9	1MSA-1377-D	PANEL Assembly, Side - Right (Includes Spring)	1
10		S-2559-4 Sems Unit, 5/16 - 18 x 1/2	2
9	1MSA-1378-D	PANEL Assembly, Side - Left (Includes Spring)	1
10		S-2559-4 Sems Unit, 5/16 - 18 x 1/2	2
11	1K-1387	SPRING, Hinge Rod	4
12	100 406-A	COVER, Battery	1
13		S-2559-4 Sems Unit, 5/16 - 18 x 1/2	4
14	100 437-A	HOOD	1
15		S-2559-4 Sems Unit, 5/16 x 1/2	2

FRONT FRAME

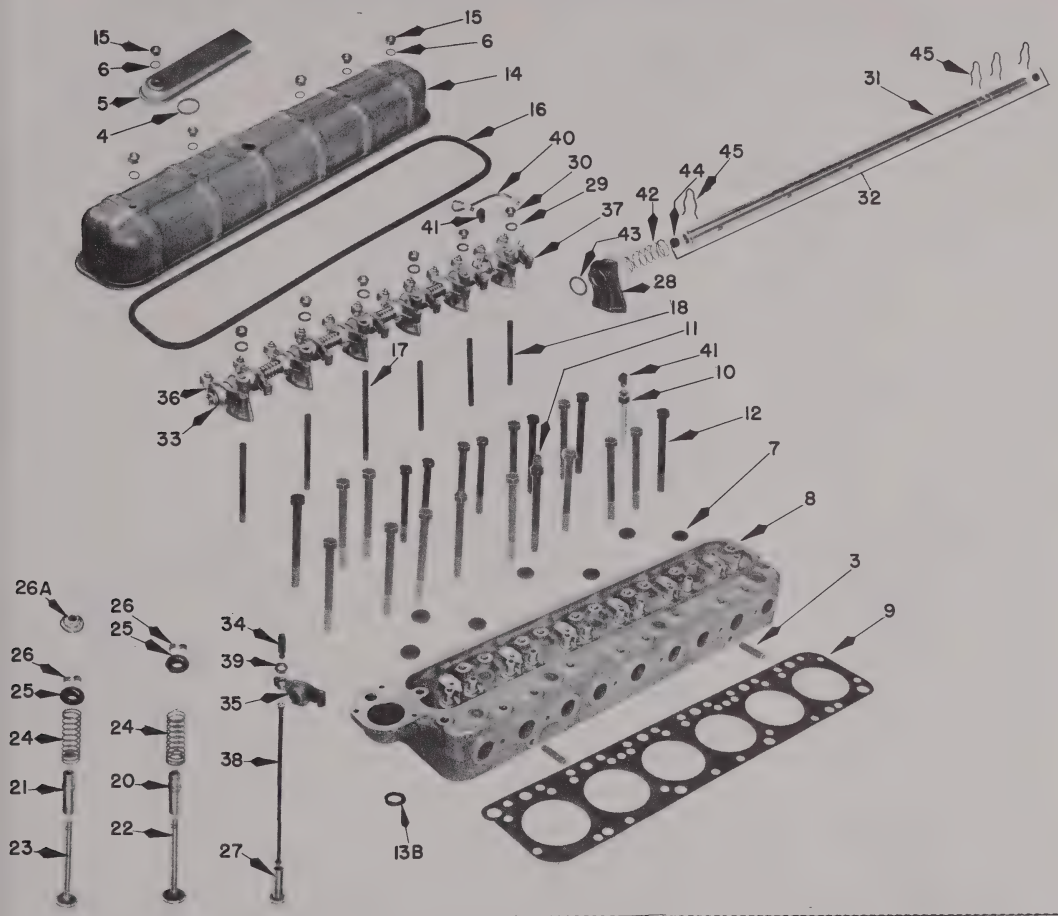


Ref. No.	Part Number	Description	No. Req.
2	100 841-A	FRAME, Front Main	1
3	100 844-A	CAP SCREW, Front Main Frame	6
5	1C-597	DOWEL PIN, Front Frame To Rear Frame	2

NAME PLATE AND TRANSFERS

Ref. No.	Part Number	Description	No. Req.
	1KA-908-B	PLATE, Gear Shifting Diagram	1
		S-2561 Screw, No. 6 x 1/4 Metal	4
	1MAS-976-K	TRANSFER SET	1
	1M-1327	PLATE, Lubrication and Maintenance Instruction	1
		S-2561 Screw, No. 6 x 1/4 Metal	4
	1M-1328-A	PLATE, Lifting Instruction	1
		S-2561 Screw, No. 6 x 1/4 Metal	4
		PLATE, Name (On Cylinder Head Cover) (Waukesha Part Number 152171)	1
		Screw, Drive (Waukesha Part Number 21766)	6

CYLINDER HEAD AND VALVE MECHANISM

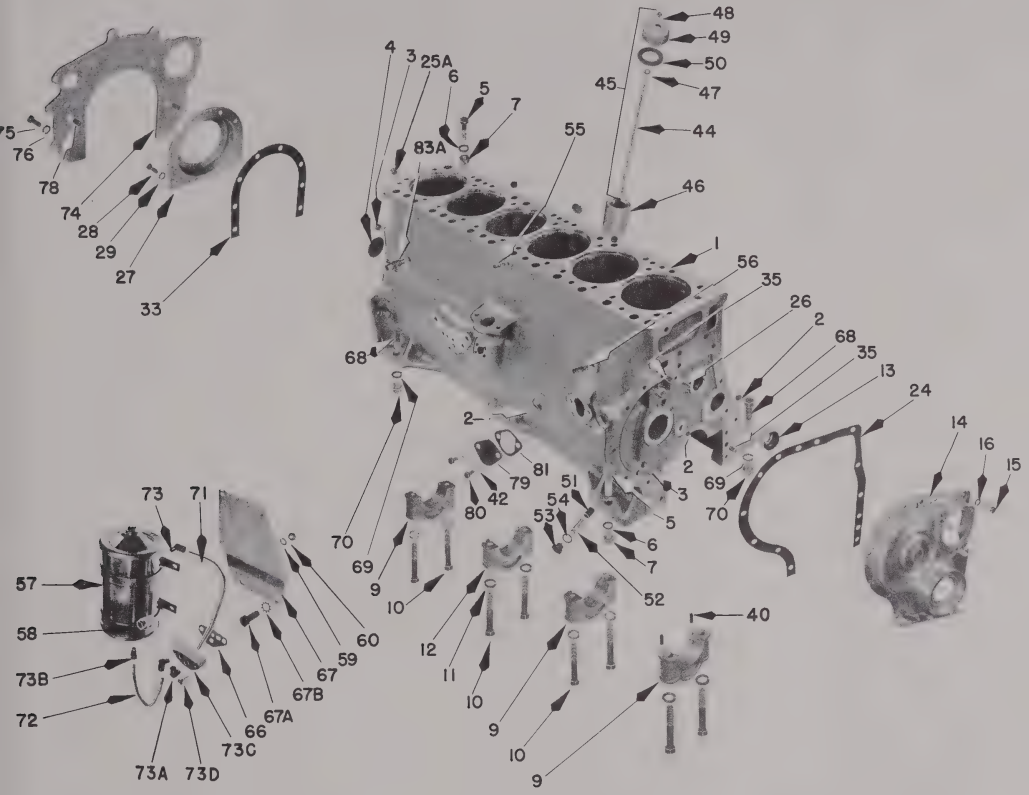


Ref. No.	Part Number	Waukesha Part Number	Description	No. Req.
3	1H-134	B9824	DOWEL, Manifold To Cylinder Head	2
4	1H-139	63043	GASKET, Breather	1
5	1K-148	180070	BREATHER	1
6	1C-169	B2747	WASHER, Cylinder Head Cover Copper	6
8		0187502	HEAD With Valve Guides, Cylinder	1
7		B4171	S-2532 Plug, 1 Dia Expansion	6
		Y6537	Plug, 3/4 Sq Hd Pipe	1
		00187502	HEAD AND VALVES, Cylinder	1
9	1M-181-C	185000D	GASKET, Cylinder Head	1
10		116273A	SCREW, Cylinder Head Oil	1
11		116777A	CAP SCREW, Cylinder Head Lifting Adapter	1

CYLINDER HEAD AND VALVE MECHANISM

Ref. No.	Part Number	Waukesha Part Number	Description	No. Req.
12		116312A	CAP SCREW, Cylinder Head	15
13B		120725	INSERT, Exhaust Valve Seat	6
14		185039B	COVER, Cylinder Head	1
15		21194	Nut, 3/8 - 24	6
		A185039B	COVER AND NAME PLATE Assembly, Cylinder Head	1
16	1M-192	185040	GASKET, Cylinder Head Cover	1
17		117454A	STUD, Rocker Arm Support - 3/8 - 24 x 5-11/16	1
18		117453A	STUD, Rocker Arm Support - 3/8 - 24 x 4-11/16	5
20		187109	GUIDE, Intake Valve	6
21		187009	GUIDE, Exhaust Valve	6
22		187036	VALVE, Intake	6
23		187136	VALVE, Exhaust	6
24		190435	SPRING, Valve	12
25		120770	RETAINER, Valve Spring	12
26		120772	LOCK, Valve Spring Retainer	24
26A		120771	CAP, Valve Stem	12
27	1M-201	180037	LIFTER, Valve	12
28		180068E	SUPPORT, Rocker Arm	6
29		21729	Lock Washer, 3/8	6
30		21194	Nut, 3/8 - 24 Hex	6
31	1M-204-A	185153	SHAFT, Rocker Arm (Order 1MS-204-A)	1
32	1MS-204-A	0185153	SHAFT With Plug (1H-212), Rocker Arm	1
33		D0185153A	SHAFT With Arms, Rocker Arm	1
34	1K-205	120860	SCREW, Rocker Arm Adjusting	12
39		21195	915 085 Nut, 3/8 - 24 Hex	12
35	1K-206-D	180567A	ARM, Valve Rocker - LH	6
35	1K-206-E	180467A	ARM, Valve Rocker - RH	6
36	1KS-206-D	0180567A	ARM Assembly, Valve Rocker - LH	6
37	1KS-206-E	0180467A	ARM Assembly, Valve Rocker - RH	6
38	1M-207	180238	ROD, Push	12
	1K-209-A	151161	TUBE, Rocker Arm (Order 1KS-209-A)	1
		73016A	S-2679 Nut, 3/16 Tube	2
40	1KS-209-A	0151161	TUBE (1K-209-A) With Nuts (S-2679), Rocker Arm Oil	1
41		73018A	S-2680 Elbow, 3/8 Tube x 1/8 PT Male	2
42	1K-210	73888	SPRING, Valve Rocker Arm Shaft	4
43	1H-211	76899	WASHER, Valve Rocker Arm Shaft	4
44	1H-212	B2857	PLUG, Rocker Arm Shaft	2
45	1H-213	76898	COTTER PIN, Valve Rocker Arm Shaft	4

CRANKCASE



Ref. No.	Part Number	Waukesha Part Number	Description	No. Req.
1		187020	CRANKCASE (Order 0187020)	1
2		78280A	S-1921 Plug, 1/8 Std Hdless Slotted Pipe	Req.
3		78280B	S-1922 Plug, 1/4 Std Hdless Slotted Pipe	Req.
4		78282A	S-1908 Plug, 1/8 Std Sq Hd Pipe	Req.
		78283G	S-1918 Plug, 1/4 Ctsk Hdless Pipe	Req.
		3337	S-2533 Plug, 2 Dia Expansion	Req.
		Y8537	Plug, 3/4 Sq Hd Pipe	Req.
		Y18802	S-1934 Plug, 1/8 Allen Hd	Req.
1		0187020	CRANKCASE Assembly	1
5			908 359-4 Cap Screw, 1/2 - 13 x 2 Hex Hd	2
6		S-2301	~~S-296~~ Lock Washer, 1/2 ~~Ext Tooth~~ INT-EXT Tooth	4
7			915 115-4 Nut, 1/2 - 13 Hex	2
9		187046	CAP, Crankshaft Main Bearing	3
10	1H-104	85802	CAP SCREW, Main Bearing	8
11		21054	920 085 Lock Washer, 1/2	8
12		187049	CAP, Crankshaft Main Bearing - Thrust	1
13	1K-110	B6156	PLUG, Idler Hole	1

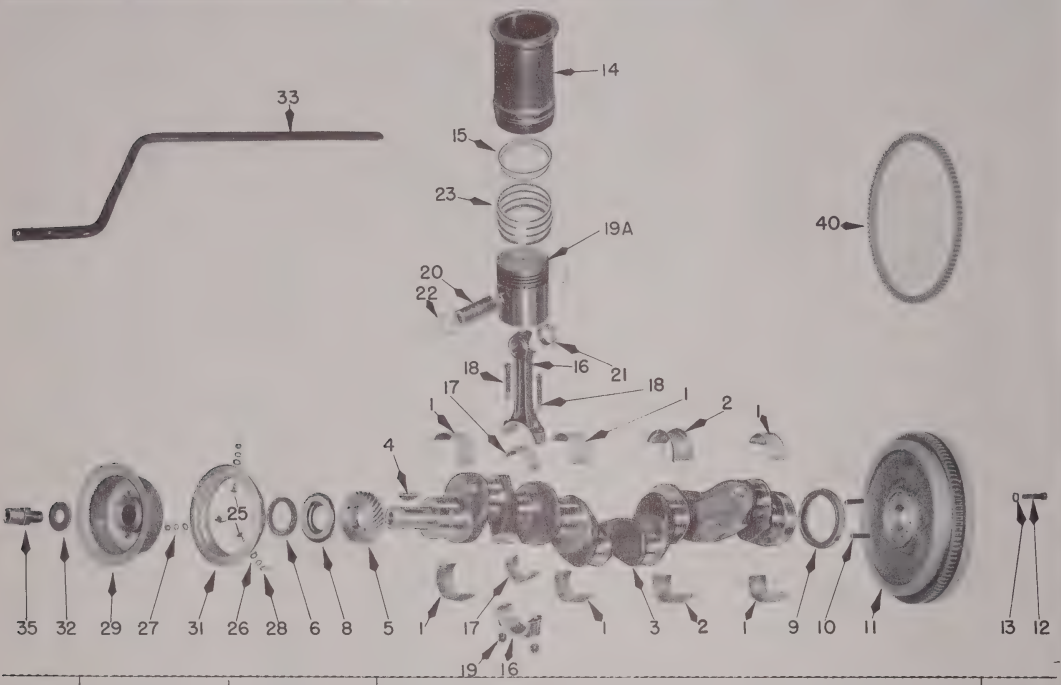
CRANKCASE

Ref. No.	Part Number	Waukesha Part Number	Description	No. Req.
14	1KAS-112	0190345	COVER, Timing Gear	1
15		21310	Cap Screw, 5/16 - 18 x 3/4 Hex Hd	12
16		21819	Lock Washer, 5/16	12
24	1K-113	44931A	GASKET, Timing Gear Cover	1
25A	1K-115-A	120934	PLUG, Oil Galley Cup	1
26	1H-117	160024	TUBE, Timing Gear Oil	1
27	1K-127	190190A	RETAINER, Rear Oil	1
28		21306	Cap Screw, 5/16 - 18 x 1/2 Hex Hd	8
29		21819	Lock Washer, 5/16	8
33	1K-130	44930B	GASKET, Rear Oil Retainer	1
35	1H-133	B-3568	DOWEL PIN, Timing Gear Cover	2
40	1K-164	B-1883	DOWEL, Main Bearing Cap	8
41	1C-218	B6231	RESTRICTOR, Oil	2
42	1K-235	B2135	WASHER, Fuel Pump Hole Cover Copper	2
44	1K-292	190052	ROD, Oil Gauge (Order 1KS-292)	1
45	1KS-292	0190052	ROD With Cap, Oil Gauge	1
46	1H-293	160172	NECK, Oil Filter	1
47	1H-294	80665	WASHER, Oil Filler Cap	1
48	1H-295	Y7076	NUT, Oil Filler Cap	1
49	1H-297	160049	CAP, Oil Filler	1
50	1H-298	160054	GASKET, Oil Filler Cap	1
51	1H-302-A	150116	PLUNGER, Oil Relief Valve	1
52		118172	SPRING, Oil Relief Valve	1
53	1H-304-A	150134	SCREW, Oil Relief Valve	1
54	1H-305-A	B8230	GASKET, Oil Relief Valve	1
55	1K-398-A	B-8053A	STUD, Cable Clip To Crankcase - 1/4 x 13/16	1
56	1L-398	B2240A	STUD, Generator Rear Support - 3/8 x 1	1
57	1MS-399-B		FILTER, Oil (Michiana Products 15500-4)	1
58			908 315-4 Cap Screw, 5/16 - 18 x 3/4 Hex Hd	4
59			920 082-4 Lock Washer, 5/16	4
60			915 148-4 Nut, 5/16 - 18 Hex	4
66	1KA-400		GASKET, Oil Filter	1
67	1K-401		BRACKET, Oil Filter	1
67A			908 354-4 Cap Screw, 1/2 - 13 x 3/4 Hex Hd	2
67B			S-296 Lock Washer, 1/2 External Tooth	2
68	1H-443		BOLT, Engine Anchor	2
69		S-3500	~~S-297~~ Lock Washer, 9/16 ~~Ext Tooth~~ Int Ext Tooth	4
70			915 116-4 Nut, 9/16 - 12 Hex	2
71	1K-464		TUBE, Oil Filter Inlet	1
72	1M-465-A		TUBE, Oil Filter Outlet	1
73	1M-466		ELBOW, Inlet Tube Restrictor	1
73A				
73B			SS-1984 Elbow, 1/8 PT x 5/16 Tube	3
73C	1M-467		MANIFOLD, Oil Filter	1
73D			908 850-4 Screw, 3/8 - 16 x 1 Mach	3

CRANKCASE

Ref. No.	Part Number	Waukesha Part Number	Description	No. Req.
74	1K-472	180048	**PLATE,** Crankcase Rear	1
75		21344	Cap Screw, 3/8 - 16 x 1 Hex Hd	8
76		21611	Lock Washer, 3/8	8
78	1K-475	B9132	**DOWEL PIN,** Rear Crankcase Plate	2
79	1K-476	73954	**COVER,** Fuel Pump Hole	1
80		21308	Cap Screw, 5/16 - 18 x 5/8 Hex Hd	2
81	1K-477	73842	**GASKET,** Fuel Pump Hole	1
83A	1KS-517		**DRAIN COCK** Assembly, Water	1

CRANKSHAFT AND RELATED PARTS



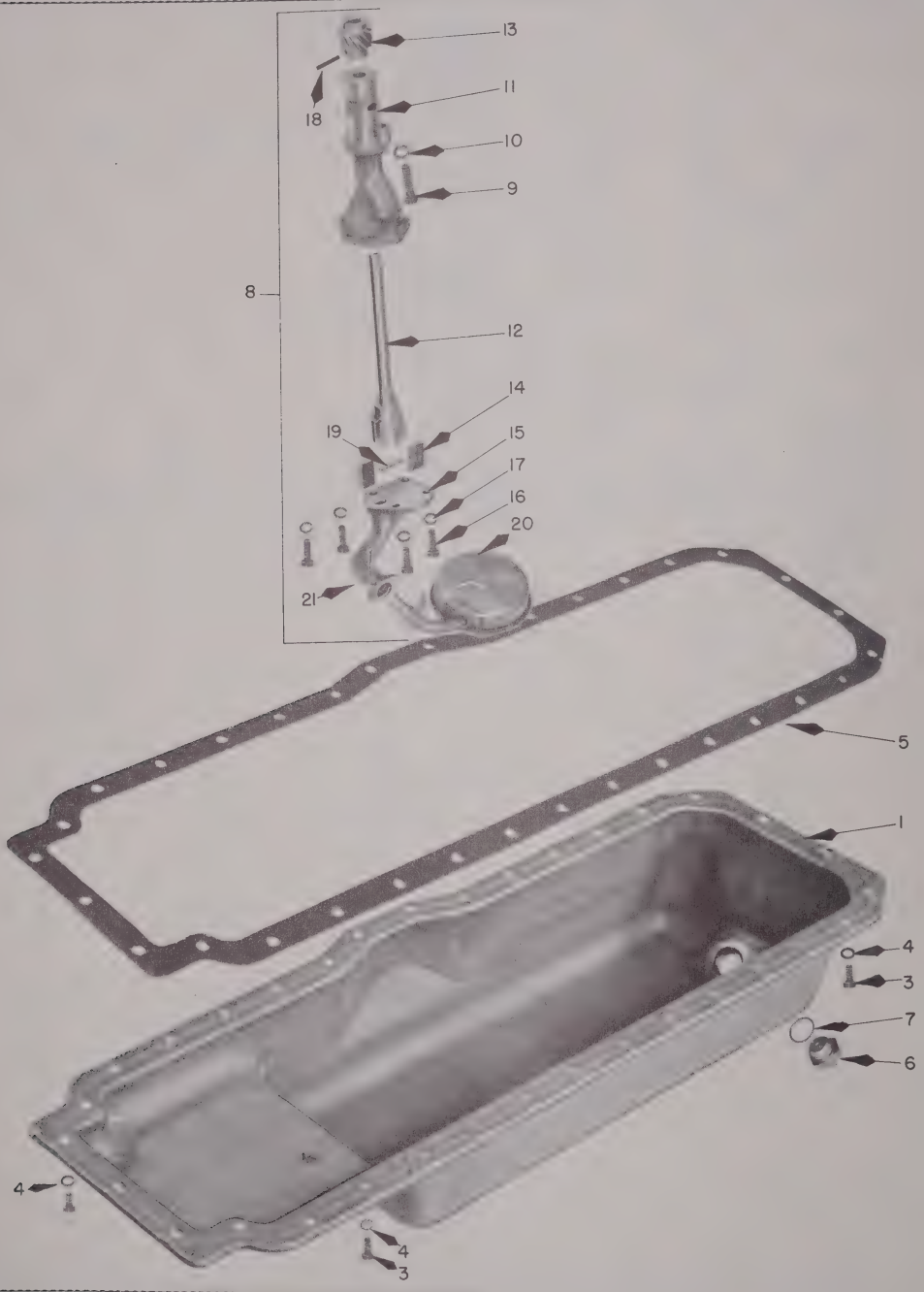
Ref. No.	Part Number	Waukesha Part Number	Description	No. Req.
1	*MS-13988-1	187022	BEARING, Crankshaft Main	6
2	*MS-13973-1	187018	BEARING, Crankshaft Main - Thrust	2
3		187111	CRANKSHAFT	1
4		26105	927 041 Key, 1/4 x 23/32 Woodruff	1
5	1K-120	190012	GEAR, Crankshaft	1
6	7K-123	120472	FELT, Fan Pulley	1
8	1K-126	180087	OIL SEAL, Crankshaft Front	1
9	1KS-129	0116002A	OIL SEAL, Crankshaft Rear	1
10	1K-134	117455	DOWEL PIN, Flywheel Crankshaft	2
	1K-135	190013A	FLYWHEEL (Order 1KS-135)	1
11	1KS-135	C190013A	FLYWHEEL (1K-135) With Ring Gear (1K-1005)	1
12	1K-136-A	118947G	CAP SCREW, Flywheel	6
13		21902	Lock Washer, 7/16	6
14		182030	SLEEVE, Cylinder	6
15		119563C	RING, Cylinder Sleeve Packing	12
16		0187107	ROD With Bushing, Connecting	6
17	*MS-13993-1	187010	BEARING, Connecting Rod	12
18	1K-219	116243	BOLT, Connecting Rod	12

*Military Standard Parts

CRANKSHAFT AND RELATED PARTS

Ref. No.	Part Number	Waukesha Part Number	Description	No. Req.
19	1H-220	80107B	NUT, Connecting Rod Bolt	12
19A		182004	PISTON	6
20		187006	PIN, Piston	6
21		187008	BUSHING, Connecting Rod	6
22		120773	RING, Piston Pin Retaining	12
23		182005	RING, Piston - Top	6
23		182105	RING, Piston - Second Groove	6
23		182205	RING, Piston (Oil) - Third and Fourth Groove	12
25	1C-347	B5496	LOCK SCREW, Fan Pulley	3
26	1C-348	B5495	WASHER, Fan PulleyLock Screw	3
27		21536	Lock Washer, 1/4	3
28		21176	Nut, 1/4 - 20 Hex Jam	3
29	1K-370	190195	PULLEY, Fan Drive (Stationary Half)	1
		X190195	PULLEY Assembly, Fan Drive (1K-370 and 1K-371)	1
		A190195	PULLEY Assembly, Fan Drive - Complete	1
31	1K-371	118078	PULLEY, Fan Drive (Adjustable Half)	1
32	1H-375	B476	WASHER, Starting Jaw	1
33	1M-536		CRANK, Starting	1
35	1HS-537	0160089A	JAW, Starting Crank	1
40	1K-1005	180069	GEAR, Flywheel Ring	1

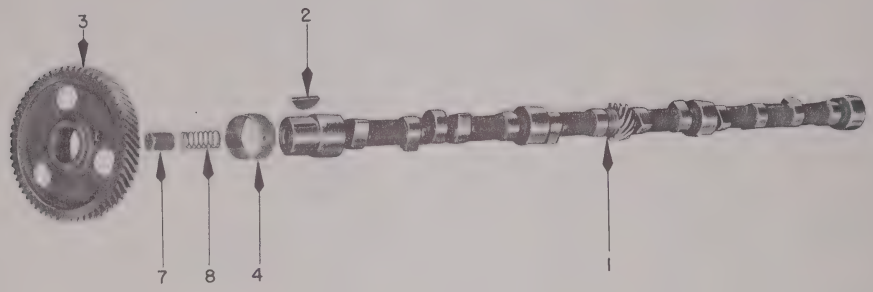
OIL PAN AND OIL PUMP



OIL PAN AND OIL PUMP

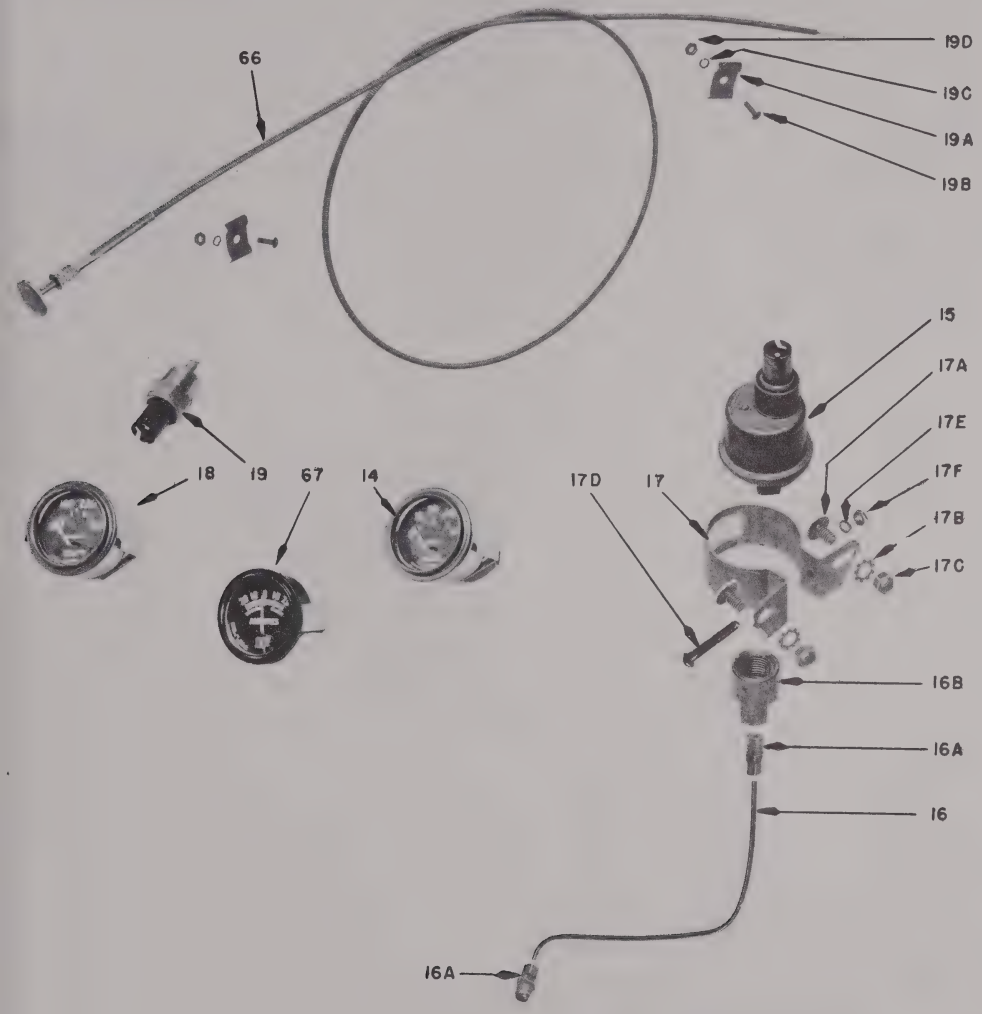
Ref. No.	Part Number	Waukesha Part Number	Description	No. Req.
1	1M-165	185114	PAN, Oil	1
3		21308	Cap Screw, 5/16 - 18 x 5/8 Hex Hd	33
4		21611	Lock Washer, 5/16	33
5	1M-166	185178	GASKET, Oil Pan	1
6		44504	PLUG, Oil Pan Drain	1
7	1H-168	B175	GASKET, Oil Pan Drain Plug	1
	1MS-327	B180180	PUMP Assembly, Oil - Less Screen	1
8	1MSA-327	OB180180	PUMP (1MS-327) And Screen (1KS-338), Oil	1
9		21352	908 333 Cap Screw, 3/8 - 16 x 1-1/4 Hex Hd	1
10		21052	920 083 Lock Washer, 3/8	1
11	1K-328	180180	BODY, Oil Pump	1
12	1K-330	180184	SHAFT, Oil Pump	1
13	1K-331	180051	GEAR, Oil Pump Drive	1
14	1K-332	41198	VANE, Oil Pump	2
15	1M-333	180482	COVER, Oil Pump	1
16		21309	908 315 Cap Screw, 5/16 - 18 x 3/4 Hex Hd	4
17		21051	920 082 Lock Washer, 5/16	4
18	1H-335	B-997	PIN, Oil Pump Gear	1
19	1H-336	150029	SPRING, Oil Pump Vane	1
20	1KS-338	116244	SCREEN, Oil	1
21		21065	932 017 Cotter Pin, 1/8 x 1	1

CAMSHAFT



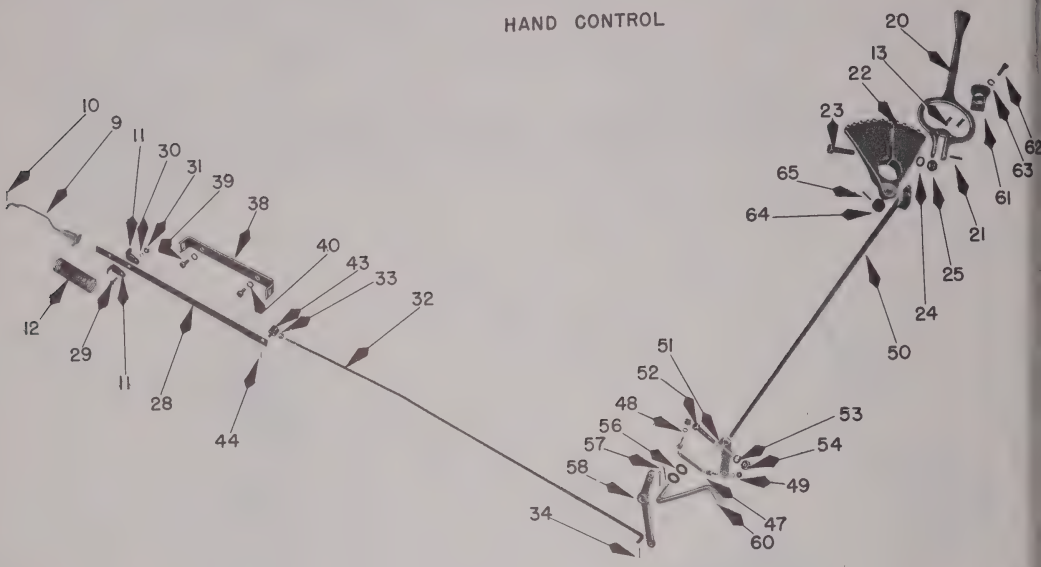
Ref. No.	Part Number	Waukesha Part Number	Description	No. Req.
1	1M-152	185223	CAMSHAFT	1
2		21011	937 020 Key, 3/16 x 1 Woodruff	1
3	1K-153	190026	GEAR, Camshaft	1
4	1HR-155	160027-S	BUSHING, Camshaft - Front	1
7	1H-159	76420	BUTTON, Camshaft Thrust	1
8	1H-160	74993	SPRING, Camshaft Thrust Button	1

ENGINE CONTROLS AND INSTRUMENTS



Ref. No.	Part Number	Description	No. Req.
9	1KS-277	END, Governor Spring - Front	1
10		932 000 Cotter Pin, 1/16 x 1/2	1
11	1H-278	END, Governor Spring - Rear	2
12	1H-282	SPRING, Governor	1
13	1C-291	SPRING, Governor Control Shaft Cap	2
14	1K-344-A	GAUGE, Oil Pressure - Receiver	1
15	1K-344-B	GAUGE, Oil Pressure - Sender	1

ENGINE CONTROLS AND INSTRUMENTS

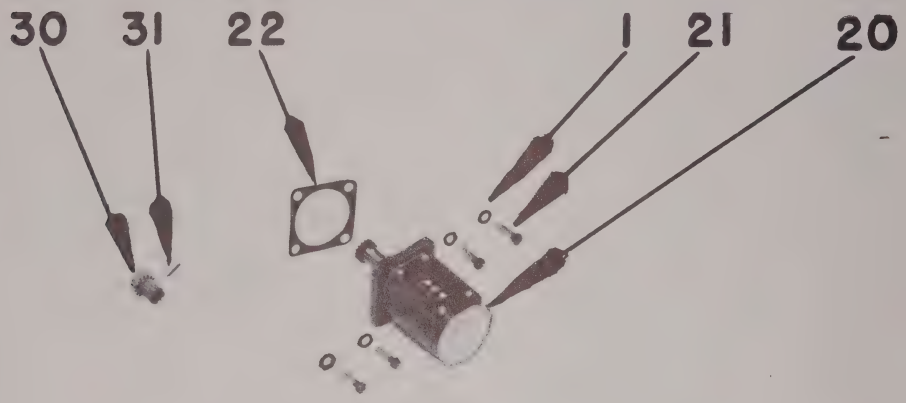


Ref. No.	Part Number	Description	No. Req.
			1
16	1K-345-B	TUBE, Oil Pressure Gauge Sender to Crankcase	2
16A		SS-1963 Connector, 1/8 PT x 3/16 Tube Male	1
16B		S-1831 Coupling, 1/4 x 1/8 Pipe	
			1
17	1M-346	CLAMP, Oil Pressure Gauge Sending Unit	2
17A		S-2959 Bolt, 5/16 - 18 x 1/2 Stove	2
17B		920 123-4 Lock Washer, 5/16 External Tooth	2
17C		915 148-4 Nut, 5/16 - 18 Hex	1
17D		S-728 Screw, No. 10 - 24 x 1-3/8 Mach	1
17E		S-263 Lock Washer, No. 10	1
17F		S-833 Nut, No. 10 - 24 Hex	
			1
18	1K-528-C	GAUGE, Temperature Receiver	
			1
19	1K-528-D	GAUGE, Temperature Sender	
			2
19A	1H-530	CLIP, Temperature Gauge and Choke Wire	2
19B		909 019-4 Screw, No. 10 - 24 x 1/2 Mach	2
19C		920 079-4 Lock Washer, No. 10	2
19D		915 538-4 Nut, No. 10 - 24 Hex	
			1
20	1H-879	LEVER, Governor Control Hand	1
21		932 834 Groov-Pin, 3/16 x 7/8	
			1
22	1H-881	BRACKET, Governor Control Shaft - Upper	1
23		908 334-4 Cap Screw, 3/8 - 16 x 1-1/2 Hex Hd	1
24		920 083-4 Lock Washer, 3/8	1
25		915 113-4 Nut, 3/8 - 16 Hex	
			1
28	1K-883	ROD, Governor Control - Front	1
29		909 136-4 Screw, No. 10 - 32 x 1/2 Mach	1
30		920 079-4 Lock Washer, No. 10	1
31		915 667-4 Nut, No. 10 - 32 Hex	
			1
32	1M-883-A	ROD, Governor Control - Rear	1
33		915 667-4 Nut, No. 10 - 32 Hex	1
34		932 000 Cotter Pin, 1/16 x 1/2	

ENGINE CONTROLS AND INSTRUMENTS

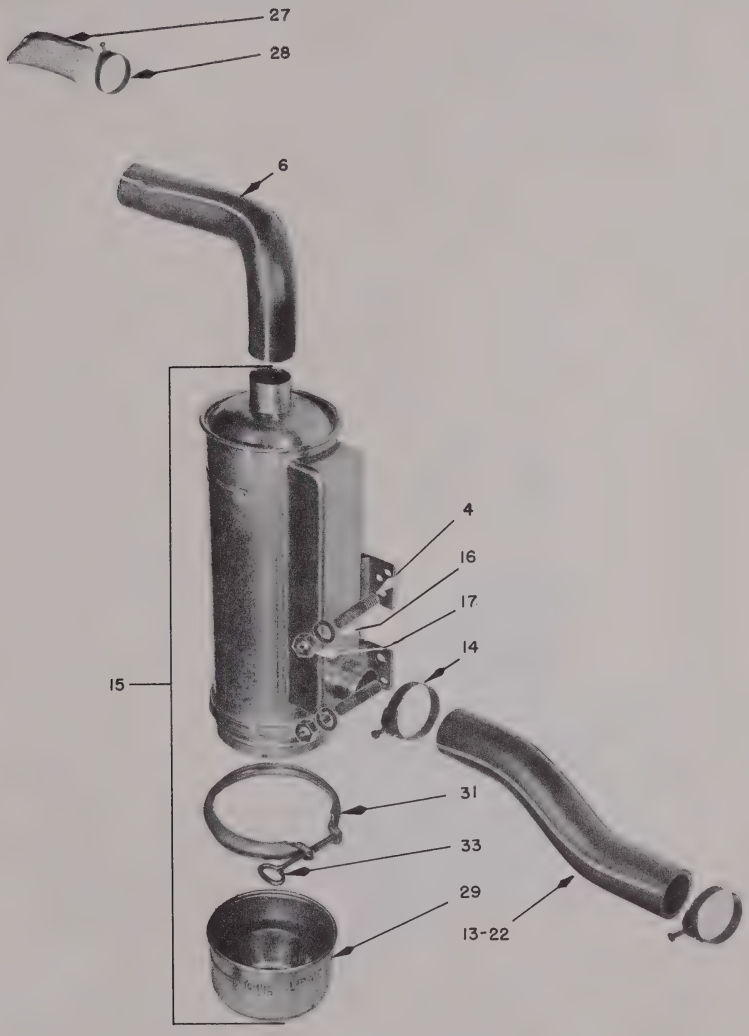
Ref. No.	Part Number	Description	No. Req.
38	1K-885	GUIDE, Governor Control Rod	1
39		908 299-4 Cap Screw, 1/4 - 20 x 1/2 Hex Hd	2
40		920 081-4 Lock Washer, 1/4	2
43	1K-886	NUT, Governor Control Rod Adjusting	1
44		932 000 Cotter Pin, 1/16 x 1/2	1
47	1H-888	JOINT, Governor Control Ball	1
48		920 079-4 Lock Washer, No. 10	2
49		915 667-4 Nut, No. 10 - 32 Hex	2
50	1KS-889	SHAFT Assembly, Governor Control	1
51	1H-890-A	LEVER, Governor Control Shaft - Lower	1
52		908 320-4 Cap Screw, 5/16 - 18 x 1-3/4 Hex Hd	1
53		920 082-4 Lock Washer, 5/16	1
54		915 112-4 Nut, 5/16 - 18 Hex	1
58	1HA-892-A	CRANK, Governor Control Bell	1
56		920 009-4 Washer, 3/8 Plain	2
57		932 008 Cotter Pin, 3/32 x 3/4	2
60	1K-893	SUPPORT, Governor Control Bell Crank	1
61	1H-895	CAP, Governor Control Shaft	1
62		S-3073-4 Cap Screw, 1/4 - 28 x 3/4 Fill Hd	1
63		920 081-4 Lock Washer, 1/4	1
64	1H-895-A	COLLAR, Governor Control Shaft	1
65		932 497 Groov-Pin, 1/8 x 3/4	1
66	1K-935	WIRE, Choke	1
	1KS-1358-E	WIRE, Oil Pressure Gauge to Sender (46" long) (Not Illustrated)	1
	1KS-1358-E	WIRE, Temperature Gauge to Sending Unit (46" long) (Not Illustrated)	1
67	1M-7353-A	AMMETER	1

HOUR METER



Ref. No.	Part Number	Description	No. Req.
1	1K-144	WASHER, Hour Meter Screw	4
20	1K-7331-B	METER, Hour	1
21		S-2580 Screw, No. 10 - 24 x 5/8 Mach	4
22	1K-7332	GASKET, Hour Meter	1
30	1K-7338	GEAR, Hour Meter Drive	1
31		932 259 Groov-Pin, 5/64 x 1/2	1

AIR CLEANER

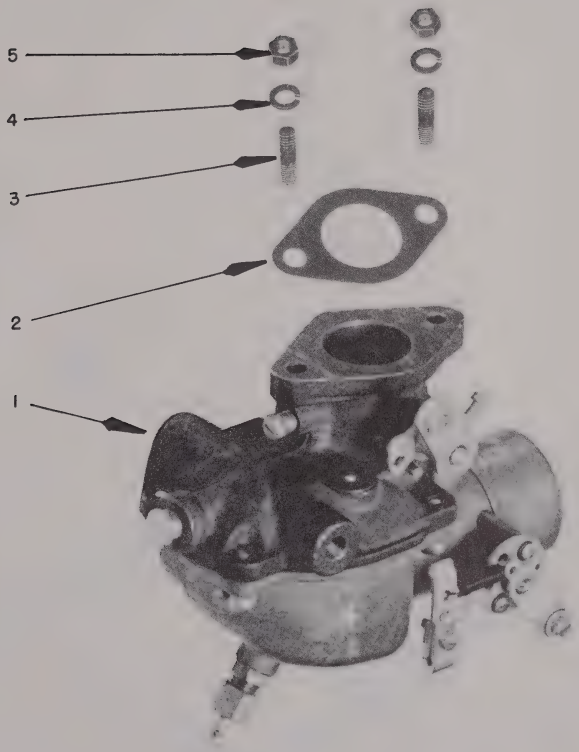


Ref. No.	Part Number	Description	No. Req.
4	1C-398	STUD - 3/8 x 1-7/16	2
6	1M-402-G	HOSE, Air Cleaner Inlet	1
13	1M-405	HOSE, Air Cleaner To Carburetor	1
14		S-3000 Clamp, 2-3/16 ID	2

AIR CLEANER

Ref. No.	Part Number	Description	No. Req.
			1
15	1MS-406-D	AIR CLEANER	2
16		920 083-4 Lock Washer, 3/8	2
17		915 002-4 Nut, 3/8 - 24 Hex	
			1
27	1L-1003-A	SCREEN, Air Intake Inlet	1
28		S-3711 Clamp, 2-1/2 ID	
			1
29	1K-6054	CUP Assembly, Air Cleaner	
			1
31	1B-6058	CLAMP AND BOLT, Air Cleaner	
			1
33	1B-6061	BOLT, Air Cleaner Clamp	

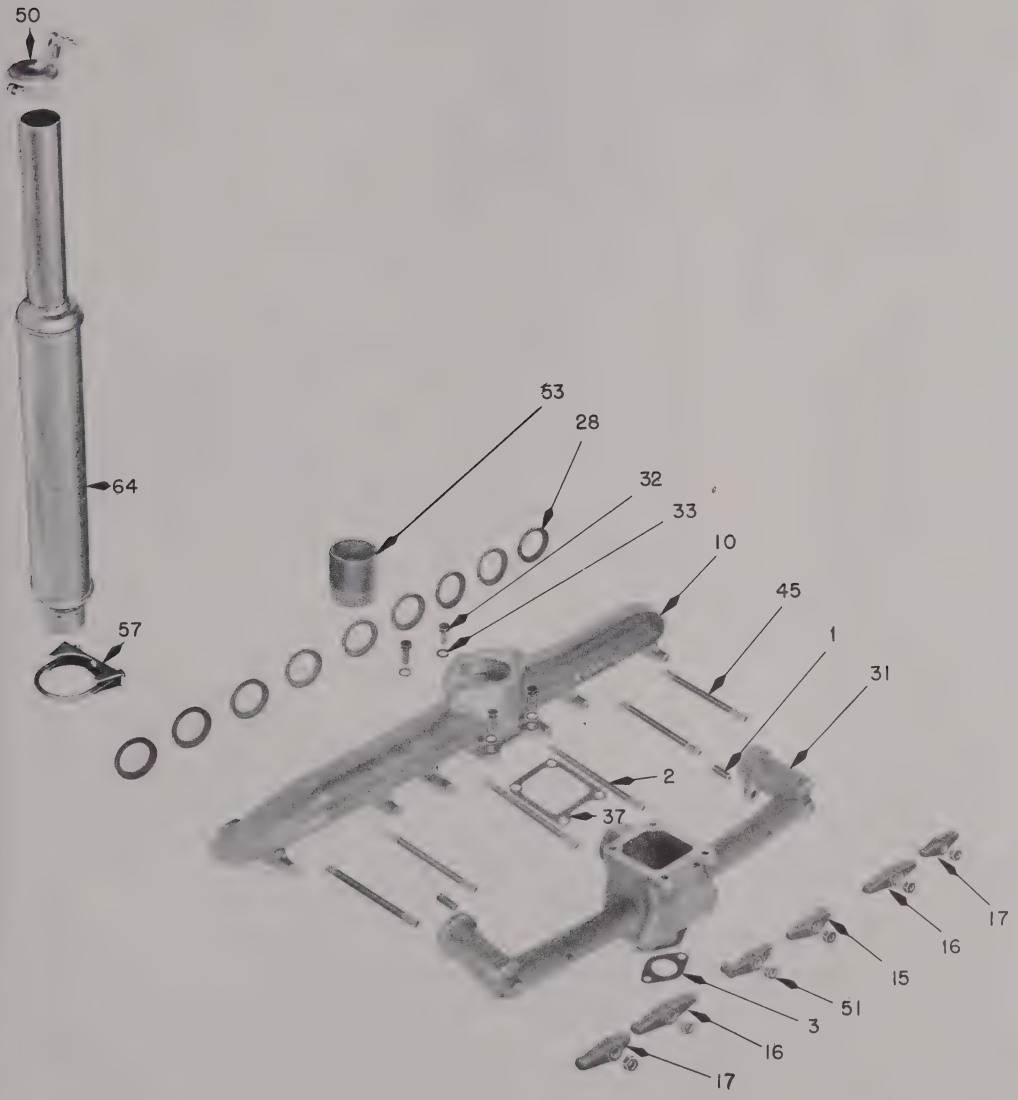
CARBURETOR



CARBURETOR

Ref. No.	Part Number	Description	No. Req.
1	1KS-393-B	CARBURETOR, (Schebler TSX-374)	1
1	1KAS-393-B	CARBURETOR (Zenith 11580)	1
2	1B-396	GASKET, Carburetor To Manifold	1
3	1K-398	STUD, Carburetor To Manifold (5/16 x 1-1/8)	2
4		920 082-4 Lock Washer, 5/16	2
5		915 001-4 Nut, 5/16 - 24 Hex	2

MANIFOLD



MANIFOLD

Ref. No.	Part Number	Waukesha Part Number	Description	No. Req.
1	1H-134		DOWEL, Manifold To Cylinder Head	2
2		117454A	STUD - 3/8 x 5-11/16	2
3	1B-396		GASKET, Carburetor To Manifold	1
10	1M-415	185342	MANIFOLD, Exhaust	1
		J185342	MANIFOLD Assembly, Intake And Exhaust	1
15	1K-416	116201	CLAMP, Manifold - Center	2
16	1K-416-A	116203	CLAMP, Manifold - Intermediate	2
17	1K-416-B	116296	CLAMP, Manifold - Outside	2
28	1MA-422	41271A	GASKET, Manifold	9
31		185441C	MANIFOLD, Intake	1
32		21349	Cap Screw, 3/8 - 16 x 1 Hex Hd	4
33		21611	Lock Washer, 3/8	4
		78282C	Plug, 1/8 Std Hdless Pipe	1
37	1K-426	116202	GASKET, Intake To Exhaust Manifold	1
45		B9621A	STUD - 3/8 x 5-1/4	4
50	1KS-431-B		CAP Assembly, Weather	1
51	1H-432	B2943	NUT, Manifold Stud (3/8")	6
53	100 696-A		ADAPTER, Muffler	1
57	1KS-446		CLAMP Assembly, Muffler	1
64	100 694-A		MUFFLER	1

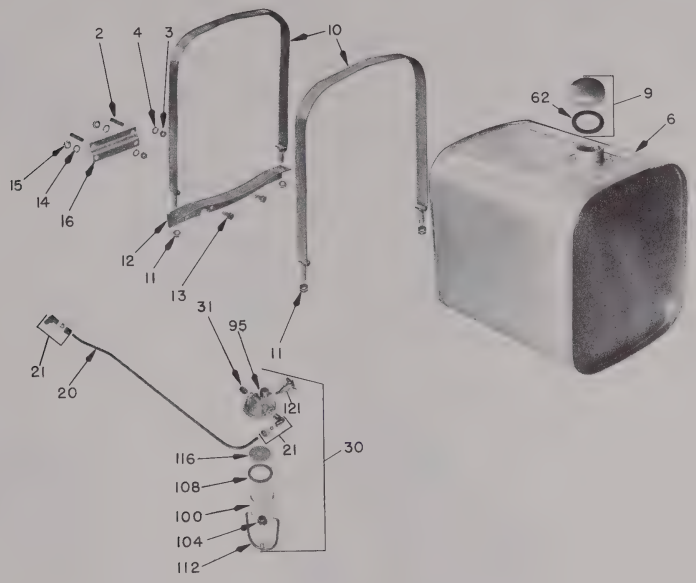
GOVERNOR

Ref. No.	Part Number	Waukesha Part Number	Description	No. Req.
1	1K-164	B-1883	DOWEL PIN, Governor Housing	2
10	1K-235	B2135	WASHER, Copper	3
2	1KA-241	190228	GEAR, Governor	1
3	1KSR-242	S-41080	SLEEVE With Bushing (1HR-272), Governor Gear	1
4	1K-250	180244	HOUSING, Governor (Order 1KS-250)	1
	1KS-250	X180244	HOUSING AND BUSHING Assembly, Governor	1
5		B4171	S-2532 Plug, 1 Dia Expansion	1
6		B560	S-2531 Plug, 5/8 Dia Expansion	1
7		76913	S-2530 Plug, 3/8 Dia Expansion	1
	1KSB-250	0180244	HOUSING (1KS-250) With Operating Lever (1KS-266), Governor	1
	1KSB-250-A	C0180244	GOVERNOR Assembly, - Complete	1
8		21310	Cap Screw, 5/16 - 18 x 3/4 Hex Hd	2
9		26641	Cap Screw, 5/16 - 18 x 2-1/4 Hex Hd	1
10	1C-235		WASHER, Copper	3
11	1K-251	180173	SHAFT, Governor	1
12		78877	S-2983 Key, Morton Hi-Pro	1
	1KSA-251-A	A180173A	SHAFT Assembly, Governor	1
13	1K-252	116250	BUSHING, Governor Shaft	1
14	1K-254	41283A	GASKET, Governor Housing	1

GOVERNOR

Ref. No.	Part Number	Waukesha Part Number	Description	No. Req.
15	1K-260	180077	CARRIER, Governor Weight	1
16	1K-261-B	180075B	SPOOL, Governor Thrust (Order 1KS-261-B)	1
	1KS-261-B	0180075B	SPOOL, BEARING AND WASHER, Governor Thrust	1
17	1K-262	160059B	WEIGHT, Governor (Order in pairs only)	2
18	1B-263-B	72928	PIN, Governor Weight	2
19	1M-264-B		ROD, Governor To Carburetor	1
20			932000 Cotter Pin, 1/16 x 1/2	1
28		X180031	LEVER Assembly, Governor	1
29	1B-267-A	160076	FORK, Governor	1
30		B6175	932 292 Groov-Pin, 5/32 x 3/4	1
31	1K-270	116251	SNAP RING, Governor Shaft	1
32	1HR-272	160069S	BUSHING, Governor	1
33	1MS-273		END Assembly, Governor Rod	1
34			915 667-4 Nut, No. 10 - 32 Hex	1
34B			932 000 Cotter Pin, 1/16 x 1/2	1
38	1H-275	73949	OIL SEAL, Governor Lever Shaft	1
39	1K-276-B	116253B	WASHER, Governor Thrust (Order 1KS-261-B)	1
40	1BR-283-A	160065	BUSHING, Governor Lever Shaft	2
41	1B-286-A	76930	SCREW, Bumper Spring Adjusting	1
42		21177	915 000 Nut, 1/4 - 28 Hex	1
43	1K-289	41456A	WASHER, Governor Gear Thrust	1
44	1B-291-A	76925	SPRING, Governor Bumper	1
46	1KS-5001-B	73436	BEARING, Governor Thrust (Order 1KS-261-B)	1

FUEL TANK, TUBING AND CONNECTIONS

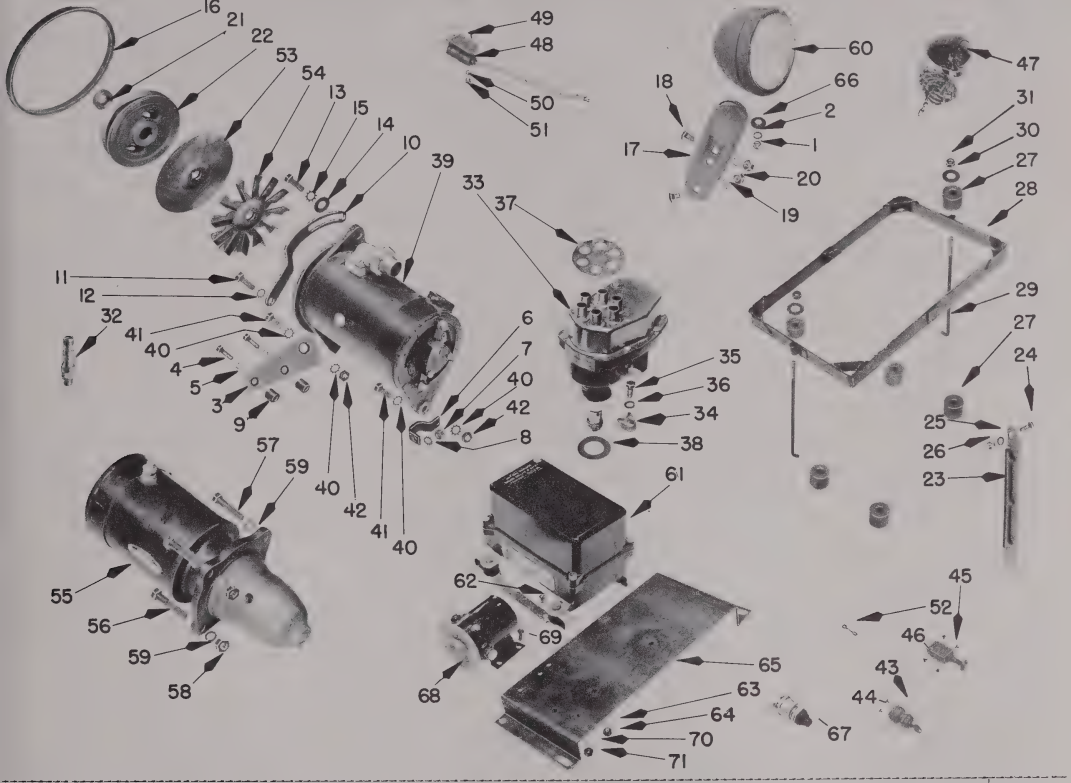


Ref. No.	Part Number	Waukesha Part Number	Description	No. Req.
2		154696A	STUD, Fuel Tank Front Support Adapter (3/8 x 7/8)	2
3			915 085-4 Nut, 3/8 - 24 Hex Jam	2
4			920 124-4 Lock Washer, 3/8 Ext Tooth	2
6	1MS-822		TANK Assembly, Fuel	1
9	7A-824-B		CAP AND GASKET, Fuel Tank Filler	1
10	1MS-826-A		STRAP Assembly, Fuel Tank	2
11			915 113-4 Nut, 3/8 - 16 Hex	4
12	1M-828		SUPPORT, Fuel Tank Front	1
13			908 330-4 Cap Screw, 3/8 - 16 x 3/4 Hex Hd	2
14			920 083-4 Lock Washer, 3/8	2
15			915 113-4 Nut, 3/8 - 16 Hex	2
16	1M-830		ADAPTER, Fuel Tank Front Support	1
20	1M-839		PIPE, Fuel Supply	1
21			SS-2632 Elbow, 1/4 Tube x 1/8 PT Male	2
30	1HBS-841		STRAINER Assembly, Fuel	1
31			S-1908 Plug, 1/8 Std Pipe	1
62	1B-1099		GASKET, Fuel Tank Filler Cap	1
95	1H-5300		BODY, Fuel Strainer	1
100	1CA-5301		BOWL, Fuel Strainer Glass	1
104	1CS-5302		CUP AND NUT, Fuel Strainer	1
108	1C-5304		GASKET, Fuel Strainer Cork	1
112	1BS-5305-A		BAIL, Fuel Strainer	1

FUEL TANK, TUBING AND CONNECTIONS

Ref. No.	Part Number	Waukesha Part Number	Description	No. Req.
116	1BS-5307-A		SCREEN, Fuel Strainer	1
121	1HS-5309		VALVE, Fuel Strainer Needle	1

STARTER AND LIGHTING EQUIPMENT



Ref. No.	Part Number	Description	No. Req.
1	1B-439	NUT, Lamp Bearing Washer	3
2		920 083-4 Lock Washer, 3/8	3
3	1K-1250-A	SUPPORT, Generator - Front	1
4		908 322-4 Cap Screw, 5/16 - 18 x 2-1/4 Hex Hd	2
5		S-295 Lock Washer, 5/16 Int Ext Tooth	2
6	1M-1250-B	SUPPORT, Generator - Rear	1
7		915 002-4 Nut, 3/8 - 24 Hex	1
8		S-293 Lock Washer, 3/8 Int Ext Tooth	1
9	1K-1255-A	SPACER, Generator Support	2
10	1M-1254-A	LINK, Generator Adjusting	1
11		908 314-4 Cap Screw, 5/16 - 18 x 5/8 Hex Hd	1
12		S-295 Lock Washer, 5/16 Int Ext Tooth	1
13		908 329-4 Cap Screw, 3/8 - 16 x 5/8 Hex Hd	1
14		920 009-4 Lock Washer, 3/8 Plain	1
15	S-293	~~920 104-4~~ Lock Washer, 3/8 ~~Ext Tooth~~ INT-EXT Tooth	1
16	1K-1257	BELT, Generator	1
17	100 082-A	BRACKET, Lamp	3
18		900 234-4 Bolt, 3/8 - 16 x 1 Sq Neck Carriage	6
19		920 124-4 Lock Washer, 3/8 Ext Tooth	6
20		915 113-4 Nut, 3/8 - 16 Hex	6
21	1M-1264-A	SPACER, Generator Pulley - Front	1

STARTER AND LIGHTING EQUIPMENT

Ref. No.	Part Number	Description	No. Req.
22	1K-1265	PULLEY, Generator	1
23	1K-1270-B	PROTECTOR, Light Wire	2
24		909 052-4 Screw, 1/4 - 20 x 1/2 Mach	4
25		920 081-4 Lock Washer, 1/4	4
26		915 111-4 Nut, 1/4 - 20 Hex	4
	1MS-1344	STRAP, Distributor Bond (Not Illustrated)	1
	S-3302	~~920-120~~ Lock Washer, 1/4 ~~Ext Tooth~~ Int-Ext Tooth	2
	101 048-A	SUPPORT, Magnetic Starter Switch (Not Illustrated)	1
27	1B-1366-B	BUFFER, Battery	12
28	1KS-1391-A	CLAMP Assembly, Battery	2
29	1K-1394	BOLT, Battery Clamp	4
30		920 083-4 Washer, 5/16 Plain	4
31		915 112-4 Nut, 5/16 - 18 Hex	4
32	1M-5201	SPARK PLUG	6
33	1KS-7324-A	DISTRIBUTOR AND COIL Assembly (Delco-Remy 1111598)	1
34	1K-7326	CLAMP, Distributor	2
35		S-3071 Cap Screw, 3/8 - 16 x 1-1/8 Hex Hd	2
36		920 083 Lock Washer, 3/8	2
37	1M-7327	DIAL, Firing Order	1
38	1K-7329	GASKET, Distributor	1
39	1M-7351-A	GENERATOR, 24 Volt - 18 Ampere (Delco-Remy 1105970)	1
40		S-299 Lock Washer, 7/16 Int Ext Tooth	4
41		908 494-4 Cap Screw, 7/16 - 20 x 1-1/4 Hex Hd	2
42		915 003-4 Nut, 7/16 - 20 Hex	2
	1K-7352	BATTERY, Storage (Not Illustrated)	2
43	1K-7354-B	SWITCH, Ignition	1
44		S-710 Screw, No. 8 - 32 x 1/4 Sems	2
45	1K-7354-C	SWITCH AND KNOB, Light	1
46		S-710-4 Screw, No. 8 - 32 x 1/4 Sems	4
47	1K-7361-D	LIGHT, Tail - 24 Volt	1
48	1M-7365	CONNECTOR, Warning Light	1
49		909 021-4 Screw, No. 10 - 24 x 5/8 Mach	2
50		920 079-4 Lock Washer, No. 10	2
51		915 538-4 Nut, No. 10 - 24 Hex	2
52	1B-7371	FUSE	1
53	1M-7373-A	BAFFLE, Generator Fan	1
54	1M-7374-A	FAN, Generator	1
55	1K-7375-D	MOTOR, Starting - 24 Volt (Delco-Remy 1108598)	1
56		908 335-4 Cap Screw, 3/8 - 16 x 1-3/4 Hex Hd	2
57		908 334-4 Cap Screw, 3/8 - 16 x 1-1/2 Hex Hd	1
58		915 149-4 Nut, 3/8 - 16 Hex	2
59		920 083-4 Lock Washer, 3/8	3
60	1K-7379-K	LAMP, Tractor - 24 Volt	3
61	1M-7381-A	REGULATOR, Voltage - 12 - 18 Ampere (Delco-Remy 1926196)	1
62		909 054-4 Screw, 1/4 - 20 x 5/8 Mach	4
63	S-3302	~~920-122-4~~ Lock Washer, 1/4 ~~Ext Tooth~~ Int-Ext Tooth	8
64		915 147-4 Nut, 1/4 - 20 Hex	4
65	1M-7382	BRACKET, Voltage Regulator	1
66	1B-7391	WASHER, Lamp Bearing	3
67	1K-7392-A	SWITCH, Starter Push Button	1
68	1K-7392-B	SWITCH, Starter Magnetic	1
69		908 820-4 Screw, 1/4 - 20 x 5/8 Mach	4
70		920 120-4 Lock Washer, 1/4 Ext Tooth	4
71		915 147-4 Nut, 1/4 - 20 Hex	4

IGNITION AND LIGHT WIRES

Ref. No.	Part Number	Description	No. Req.
	1M-245-B	CABLE, Spark Plug - 1 and 6 Cylinder (17-1/2" long)	2
	1M-245-C	CABLE, Spark Plug - 3 and 4 Cylinder (5-3/4" long)	2
	1M-246-A	CABLE, Spark Plug - 2 and 5 Cylinder (15" long)	2
	1M-1351	CABLE, Battery Connector (10" long)	1
	1KS-1356-A	WIRE, Ammeter to Starter Switch (32" long)	1
	1KS-1356-B	WIRE, Ammeter to Ignition Switch (18" long)	1
	1KS-1357	WIRE, Starter Push Button Ground (4" long)	1
	1MS-1357-A	CABLE, Battery Ground (11-1/4" long) 908 314-4 Cap Screw, 5/16 - 18 x 5/8 Hex Hd S-295 Lock Washer, 5/16 Int Ext Tooth 915 148-4 Nut, 5/16 - 18 Hex	1 1 1 1
	1KS-1358-B	WIRE, Starter Switch (4" long)	1
	1KS-1358-C	WIRE, Panel to Starter Switch (32" long)	1
	1KS-1358-D	WIRE, Ignition Switch to Temperature Gauge (16" long)	1
	1KS-1358-E	WIRE, Oil Pressure Gauge to Sender (46" long)	1
	1KS-1358-E	WIRE, Temperature Gauge to Sending Unit (46" long)	1
	1MS-1358	WIRE, Ammeter to Light Switch (16-1/2" long)	1
	1MS-1359-D	LIGHT WIRE, Fender to Lamp (37-1/4" long)	3
	1M-1359-N	LIGHT WIRE, Platform to Fender (43" long, yellow)	2
	1M-1359-P	LIGHT WIRE, Platform to Fender (43" long, black)	2
	1MS-1376-A	CABLE, Starter Switch to Battery (32" long)	1
	1MS-7367-A	CABLE, Generator to Regulator (53" long)	1
	1MS-7368-B	HARNESS, Light Wire	1
	1L-7369-D	WIRE, Ignition Switch to Distributor (68" long) S-2553 Screw, No. 8 - 32 x 3/8 Rd Slotted Hd	1 1
	1M-7369-D	WIRE, Regulator to Ammeter (36" long) S-2553 Screw, No. 8 - 32 x 3/8 Rd Slotted Hd	1 1
	1KS-7377	CABLE, Starter Switch to Starter (38" long)	1

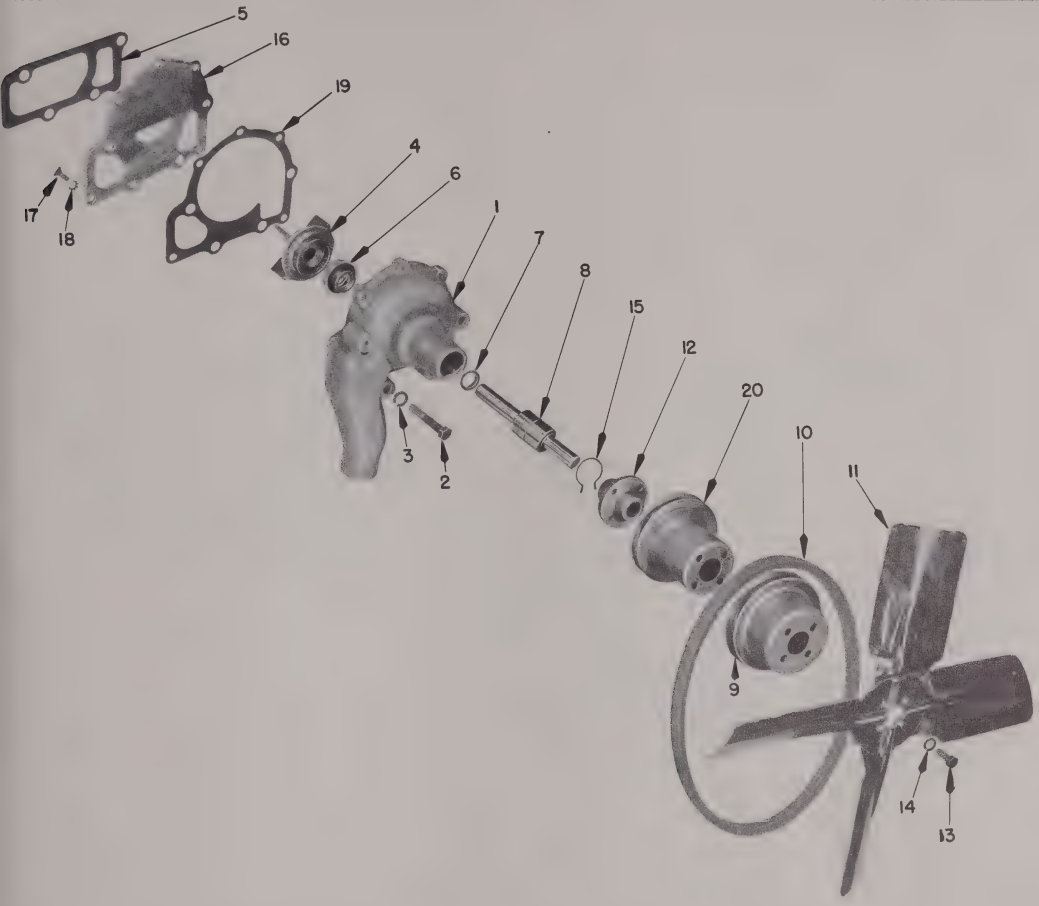
CLIPS, CLAMPS AND COVERS

Ref. No.	Part Number	Description	No. Req.
	1H-530	CLIP, Choke Wire (3/4" x 1-1/8")	1
		909 019-4 Screw, No. 10 - 24 x 1/2 Mach	1
		920 079-4 Lock Washer, No. 10	1
		915 538-4 Nut, No. 10 - 24 Hex	1
	1B-1014	CLAMP, Wire (3/4" wide, 3/4" long, 7/32" hole)	4
		909 019-4 Screw, No. 10 - 24 x 1/2 Mach	4
		920 079-4 Lock Washer, No. 10	4
		915 538-4 Nut, No. 10 - 24 Hex	4
	1K-1271-C	SUPPORT, Starter Cable (1-1/2" wide, 2-5/8" long, 3/8" hole and 1-1/16" hole)	1
		908 300-4 Cap Screw, 1/4 - 20 x 5/8 Hex Hd	1
		920 081-4 Lock Washer, 1/4	1
		915 111-4 Nut, 1/4 - 20 Hex	1
	1K-1271-F	BRACKET, Light Wire Protector (1-1/8" wide, 4-1/8" developed length, 11/16" hole and 9/16"x5/32" hole)	2
	1K-1272-A	CLIP, Lighting Wire (1/2" wide, 3-3/16" developed length)	4
	1K-1272-B	CLIP, Lighting Wire Connector to Axle Carrier (3/4" wide, 3-3/32" length, 11/32" hole)	2
		908 315-4 Cap Screw, 5/16 - 18 x 3/4 Hex Hd	2
		920 082-4 Lock Washer, 5/16	2
	1K-1272-C	CLIP, Light Wire Upper (1-1/2" long x 3/4", 11/32" hole)	4
		900 234-4 Bolt, 3/8 - 16 x 1 Sq Neck Carriage	1
		920 124-4 Lock Washer, 3/8 Ext Tooth	1
		915 113-4 Nut, 3/8 - 16 Hex	1
	1H-1273-A	CLIP, Light Wire Harness (2-1/2" long, 7/8" wide, 9/32" hole)	1
		909 019-4 Screw, No. 10 - 24 x 1/2 Mach	1
		920 079-4 Lock Washer, No. 10	1
		915 538-4 Nut, No. 10 - 24 Hex	1
	1K-1273-B	CLIP, Generator Cable (5/8" wide, 3-1/8" long, 9/32" hole)	1
		920 081-4 Lock Washer, 1/4	1
		915 000-4 Nut, 1/4 - 28 Hex	1
	1K-1273-D	CLIP, Wrap Around (3-3/4" long x 1/2" wide, no hole)	4
	1KS-1273-E	CLIP Assembly, Light Wire (1-1/4" x 1-1/16")	4
		909 136-4 Screw, No. 10 - 32 x 1/2 Mach	4
	1K-1273-F	CLAMP, Fuse	2
		909 136-4 Screw, No. 10 - 32 x 1/2 Mach	1
		915 667-4 Nut, No. 10 - 32 Hex	1
	1K-1273-G	CLIP, Light Wire to Axle Carrier (3/4" wide, 1-11/16" long)	2
	1M-1273	CLIP, Generator Cable (4-1/4" long, 5/8" wide, 9/32" hole)	1
		908 299-4 Cap Screw, 1/4 - 20 x 1/2 Hex Hd	1
		920 081-4 Lock Washer, 1/4	1

GROMMETS

Ref. No.	Part Number	Description	No. Req.
	1H-237	RING, Rubber (7/8" OD, 1/2" ID, 3/16" Thick)	1
	1A-7362	GROMMET, Rubber (1/16" Groove, 5/16" Thick 7/8" OD, 3/8" ID)	1
	1CD-7364	GROMMET, Rubber (1-3/8" Dia, 5/32" Groove, 3/4" Hole)	10

WATER PUMP

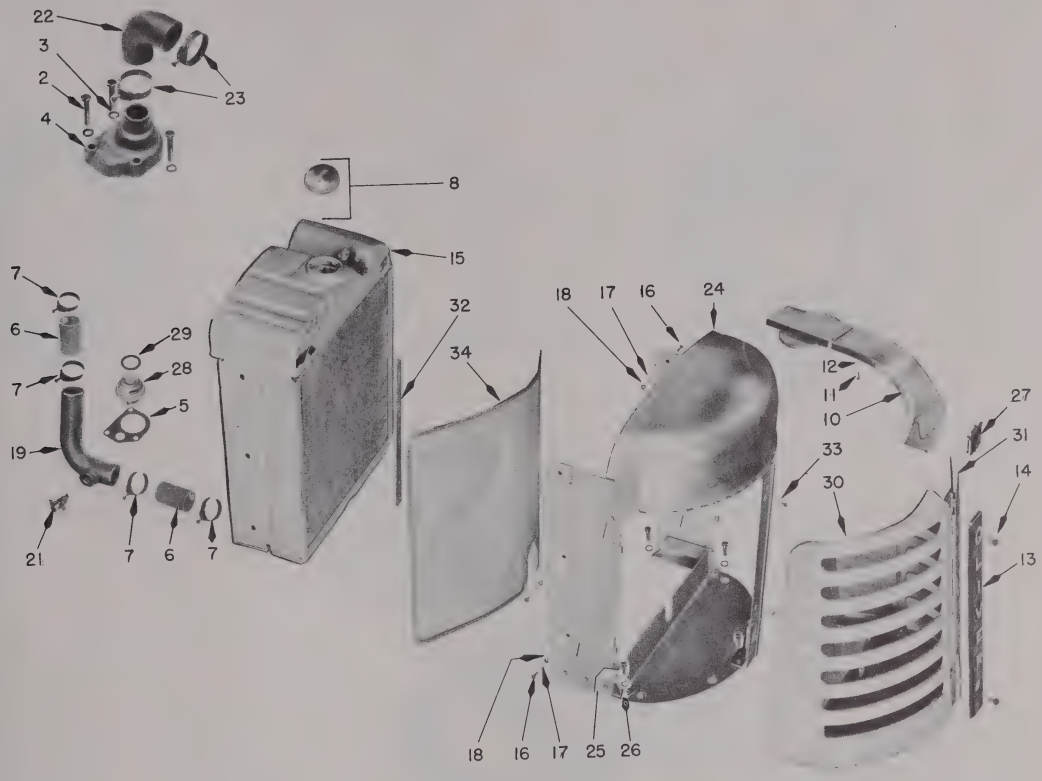


Ref. No.	Part Number	Waukesha Part Number	Description	No. Req.
1	1M-350-A	180160	BODY, Water Pump	1
		D180160	PUMP Assembly, Water	1
2		21310	Cap Screw, 3/8 - 16 x 2-1/4	4
3		21819	Lock Washer, 3/8	4
4	1K-351	180163	IMPELLER, Water Pump	1
5	1M-354	152054	GASKET, Water Pump To Case	1
6	1KS-358-B	120320	SEAL Assembly, Water Pump	1
7	1H-360	78645	SLINGER, Water Pump	1
8	1HS-365-A	0160356A	SHAFT With Bearing, Water Pump (Order 1KSA-365-A)	1
	1KSA-365-A	A0160356A	SHAFT (1HS-365-A) With Hub (1K-380) and Slinger (1H-360), Water Pump	1
9	1K-369	180086	PULLEY, Water Pump	1

WATER PUMP

Ref. No.	Part Number	Waukesha Part Number	Description	No. Req.
10		190003B	BELT, Fan	1
11	1M-377		FAN, Air	1
12	1K-380	116516	HUB, Fan Pulley	1
13			908 315 Cap Screw, 5/16 - 18 x 3/4 Hex Hd	4
14			900 082 Lock Washer, 5/16	4
15	1H-381	76999	SNAP WIRE, Water Pump Shaft Retainer	1
16	1M-383-A	180161	COVER, Water Pump	1
17		21741	Screw, 1/4 - 20 x 5/8 Mach	4
18		21842	S-253 Lock Washer, 1/4 Shakeproof	2
19	1M-384	152300	GASKET, Water Pump Cover	1
20	1K-1256	41081	PULLEY, Generator Drive	1

RADIATOR AND CONNECTIONS

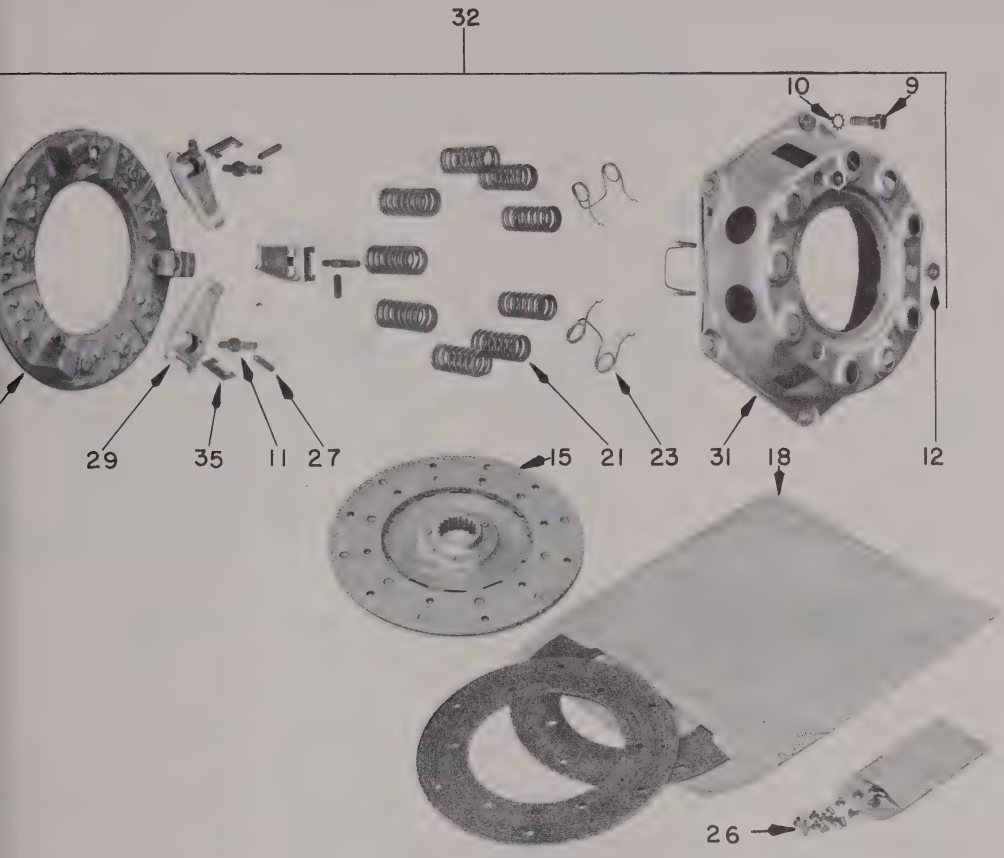


Ref. No.	Part Number	Description	No. Req.
4	1K-386-B	ELBOW, Engine Water Outlet	1
2		908 335-4 Cap Screw, 3/8 - 16 x 1-3/4 Hex Hd	3
3		920 083-4 Lock Washer, 3/8	3
5	1K-387	GASKET, Engine Water Outlet Elbow	1
6	1B-388	HOSE, Radiator (3" Long) (See 1B-517)	1
7		S-2952 Clamp, 1-15/16 ID	2
8	1K-507	CAP, Radiator Pressure	1
10	1MS-509	BAR Assembly, Radiator Top Center	1
11		909 052-4 Screw, 1/4 - 20 x 1/2 Mach	1
12		920 122-4 Lock Washer, 1/4 Ext Tooth	1
13	1MS-512	BAR OUTER Assembly, Radiator Shell Center	1
14		909 056-4 Screw, 1/4 - 20 x 7/8 Mach	2
15	1MS-513-J	RADIATOR	1
16		909 069-4 Screw, 5/16 - 18 x 5/8 Mach	6
17		920 123-4 Lock Washer, 5/16 Ext Tooth	6
18		915 112-4 Nut, 5/16 - 18 Hex	6

RADIATOR AND CONNECTIONS

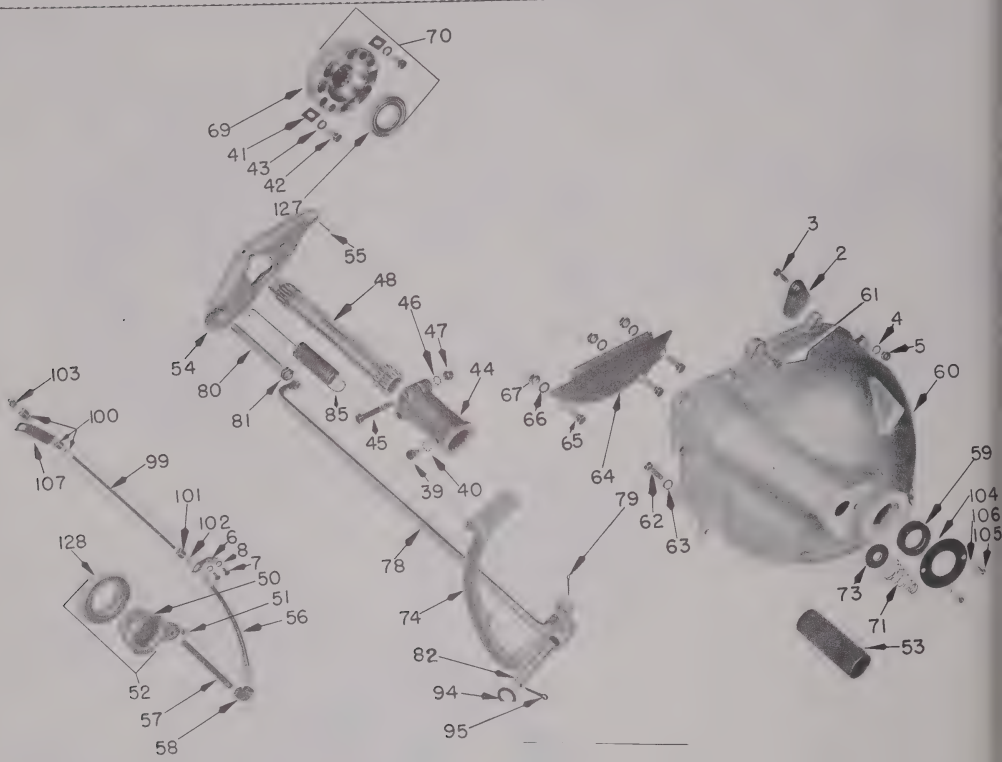
Ref. No.	Part Number	Description	No. Req.
19	1K-516-B	ELBOW, Engine Water Inlet	1
6	1B-517	HOSE, Radiator (2-1/4" Long) (See 1B-388)	1
7		S-2952 Clamp, 1-15/16 ID	2
21	1KS-517	DRAIN COCK, Water	1
22	1M-518	HOSE, Water Outlet Elbow	1
23		S-2952 Clamp, 1-15/16 ID	2
24	1MS-519	SHELL Assembly, Radiator	1
25		908 331-4 Cap Screw, 3/8 - 16 x 7/8 Hex Hd	6
26		920 083-4 Lock Washer, 3/8	6
27	1M-523	EMBLEM, Radiator Shell	1
28	1J-525	THERMOSTAT	1
29	1A-526	GASKET, Thermostat	1
30	1M-1280-A	GRILLE, Radiator - Right	1
31	1M-1280-B	GRILLE, Radiator - Left	1
32	1M-1282	CLAMP, Radiator Screen Center	1
33		908 914-4 Screw, 1/4 - 28 x 1 Mach	2
34	1MS-1290	SCREEN Assembly, Radiator	1

CLUTCH AND CLUTCH CONTROLS



Ref. No.	Part Number	Description	No. Req.
2	1K-473	COVER, Flywheel Pointer	1
3		908 314-4 Cap Screw, 5/16 - 18 x 5/8 Hex Hd	1
4		920 082-4 Lock Washer, 5/16	1
5		915 112-4 Nut, 5/16 - 18 Hex	1
6	1K-529	BRACKET, Grease Tube (Inside)	1
7		909 039-4 Screw, No. 12 - 24 x 5/8 Mach	2
8		920 080-4 Lock Washer, No. 12	2
9	1K-552	SCREW, Clutch Drive	6
10		920 156-4 Lock Washer, 3/8 Internal Tooth	6
11	1B-553-A	EYEBOLT, Clutch (Order 1BS-553-B)	3
	1BS-553-B	EYEBOLT (1B-553-A) And Nut(1BR-554), Clutch	3
12	1BR-554	NUT, Clutch Eyebolt (Order 1BS-553-B)	3
13	1KR-555	PLATE, Clutch Pressure	1

CLUTCH AND CLUTCH CONTROLS

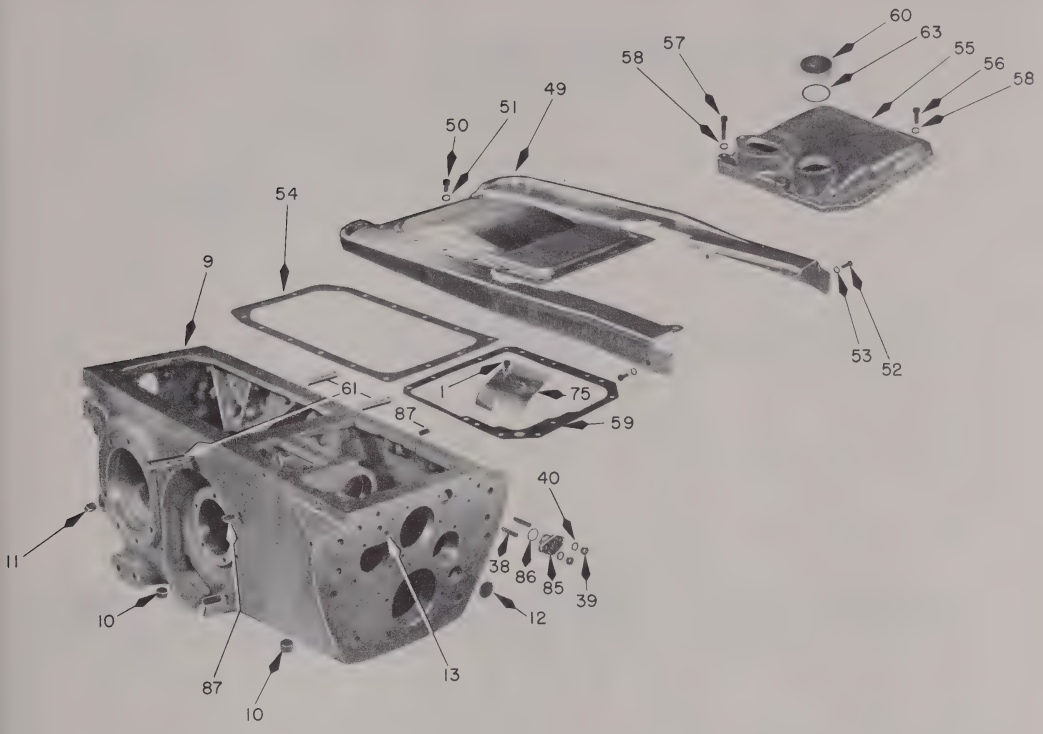


Ref. No.	Part Number	Description	No. Req.
15	1MS-556-A	PLATE With Facings, Clutch Driven	1
18	1MAS-558-C	FACINGS Package, Clutch (2 Facings and Rivets)	1
21	1B-559-A	SPRING, Clutch Thrust	6
21	1M-559-A	SPRING, Clutch Thrust	3
23	1B-560	SPRING, Clutch Anti-Rattle	3
26	1K-562	RIVET, Clutch Facing	24
27	1B-565	PIN, Clutch Release Lever	3
29	1K-568	LEVER, Clutch Release	3
31	1K-569	COVER, Clutch (Order 1KAS-569)	1
32	1KAS-569	COVER Assembly, Clutch	1
35	1B-570	STRUT, Clutch	3
39	1K-573	SET SCREW, Input Shaft Coupling	1
40		920 156-4 Lock Washer, 3/8 Internal Tooth	1
41	1K-574	RETAINER, Clutch Pilot Bearing	2
42		908 314-4 Cap Screw, 5/16 - 18 x 5/8 Hex Hd	2
43		920 082-4 Lock Washer, 5/16	2

CLUTCH AND CLUTCH CONTROLS

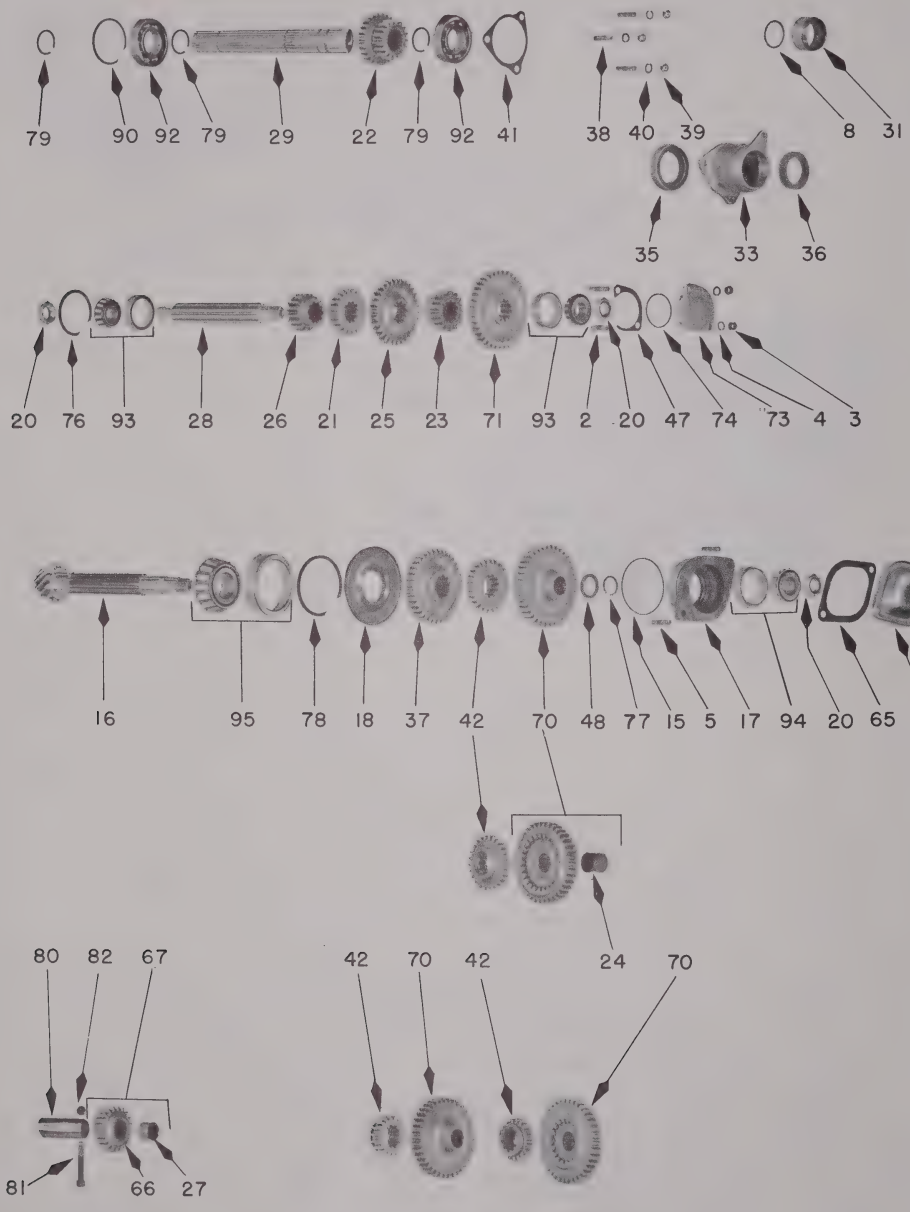
Ref. No.	Part Number	Description	No. Req.
44	1KA-576-A	COUPLING, Input Shaft	1
45		908 486-4 Cap Screw, 3/8 - 24 x 2-1/4 Hex Hd	2
46		915 002-4 Nut, 3/8 - 24 Hex	2
47		920 124-4 Lock Washer, 3/8 External Tooth	2
48	1K-579-A	SHAFT, Clutch	1
50	1KS-584-A	SLEEVE Assembly, Clutch Release Bearing	1
51		S-1921 Plug, 1/8 Std Hdless Slotted Pipe	1
52	1KSA-584-A	SLEEVE (1KS-584-A) With Bearing (1DS-5022), Clutch Release	1
53	1K-585	TUBE, Clutch Housing	1
54	1K-586	LEVER, Clutch Release	1
55		932 025 Cotter Pin, 5/32 x 1	1
56	1K-588	TUBE, Clutch Release Bearing Flexible	1
57	1K-588-A	PIPE, Clutch Release Bearing Grease	1
58		S-1730 Elbow, 1/8 - 90° Mall	1
59	1K-589	FELT, Clutch Housing Seal	1
60	1K-590-A	HOUSING, Clutch (Order 1KS-590-A)	1
	1KS-590-A	HOUSING (1K-590-A) With Tube (1K-585), Clutch	1
61		908 334-4 Cap Screw, 3/8 - 16 x 1-1/4 Hex Hd	2
62		908 332-4 Cap Screw, 3/8 - 16 x 1 Hex Hd	2
63		920 083-4 Lock Washer, 3/8	2
		932 025 Cotter Pin, 5/32 x 1	1
64	1K-592	SHIELD, Clutch Housing Dust	1
65		908 329-4 Cap Screw, 3/8 - 16 x 5/8 Hex Hd	2
66		920 083-4 Lock Washer, 3/8	2
69	1K-633-A	HUB, Drive (Order 1KS-633-A)	1
70	1KS-633-A	HUB AND BEARING Assembly, Drive	1
71	1K-894	SPRING, Clutch Release Rod Seal	1
73	1K-897-A	SEAL, Clutch Rod	1
74	1K-898-A	PEDAL, Clutch	1
78	1KS-899-A	ROD Assembly, Clutch Release	1
79		932 017 Cotter Pin, 1/8 x 1	1
80	1K-900-A	END, Clutch Release Rod	1
81		915 087-4 Nut, 1/2 - 20 Hex Jam	1
82	1H-902	PIN, Clutch Pedal	1
85	1K-903	SPRING, Clutch Pedal	1
94	1B-940	WASHER, Control Spring Lever	1
95		932 035 Cotter Pin, 3/16 x 1-1/4	1
99	1K-1020	TUBE, Clutch Release Bearing Grease	1
100		SS-1983 Fitting, 1/4 Tube x 1/8 PT Female	1
101		S-1747 Nut, 1/4 Tube SAE Comp	1
102		S-1748 Sleeve, 1/4 Tube SAE Comp	1
103		939 001 Fitting, 1/8 PT Alemite Hydr Strt	1
104	1K-1063	RETAINER, Clutch Housing Felt	1
105		909 037-4 Screw, No. 12 - 24 x 7/16 Mach	2
106		920 080-4 Lock Washer, No. 12	2
107	1K-1084	BRACKET, Grease Tube	1
127	1KS-5010	BEARING, Clutch Pilot Ball (New Departure 773LO7-LYIC)	1
128	1DS-5022	BEARING, Clutch Release (Aetna A-893-31)	1

TRANSMISSION, REAR FRAME AND PLATFORM



Ref. No.	Part Number	Description	No. Req.
1	1A-159	CAP SCREW, Transmission Counter Shaft Oil Baffle (3/8 x 3/4)	1
60	1CA-297	CAP, Transmission Filler	1
63	1C-298	GASKET, Transmission Filler Cap	1
2	1A-398	STUD, Countershaft Bearing Cover (3/8 x 1-1/2)	2
3		915 002-4 Nut, 3/8 - 24 Hex	2
4		920 083-4 Lock Washer, 3/8	2
5	1H-398	STUD, Bevel Pinion Shaft Bearing Cage (3/8 x 1-3/4)	2
6		915 002-4 Nut, 3/8 - 24 Hex	2
7		920 083-4 Lock Washer, 3/8	2
8	1K-577	SEAL, Transmission Input Shaft	1
9	1M-596-E	FRAME, Rear Main (Order 1MS-596-K)	1
	1MS-596-K	FRAME With Pivot Pins, Rear Main	1
10		S-1913 Plug, 3/4 Ctsk Hd Pipe	2
11		S-1900 Plug, 1/2 Std Pipe	1
12		935 020 Plug, 1-3/8 Expansion	1
13		S-1922 Plug, 1/4 Std Hdless Slotted Pipe	1
15	1M-600	SEAL, Bevel Pinion Shaft Bearing Cage	1
16	1M-602-B	PINION AND SHAFT, Bevel (11 Teeth)	1

TRANSMISSION, REAR FRAME AND PLATFORM



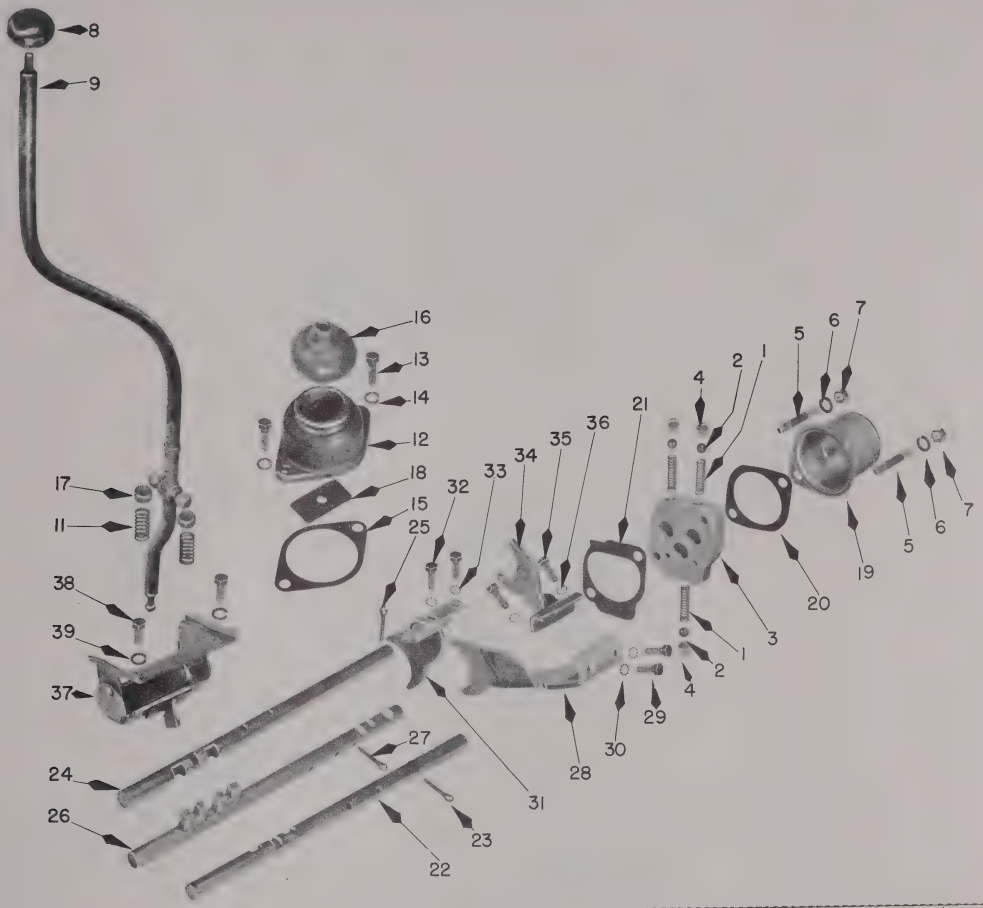
TRANSMISSION, REAR FRAME AND PLATFORM

Ref. No.	Part Number	Description	No. Req.
	1MSR-602-B	SHAFT (1M-602-B) With Drive Gear (1M-644-B), Bevel Pinion (Matched Set) (11/50 Bevels)	1
17	1M-603	CAGE, Bevel Pinion Shaft Bearing	1
18	1MS-604	SHIELD, Bevel Pinion Shaft Rear Bearing	1
19	1K-605	COVER, Bevel Pinion Shaft Bearing Cage	1
20	1M-606	NUT, Countershaft And Bevel Pinion Shaft (1/4 - 14)	3
21	1M-607	GEAR, Countershaft (20 Teeth)	1
22	1M-608	GEAR, Transmission Sliding (24 and 17 Teeth)	1
23	1M-609	GEAR, Countershaft (17 Teeth)	1
24	1M-610	BUSHING, Bevel Pinion Shaft Idler Gear	1
25	1M-611	GEAR, Countershaft (30 Teeth)	1
26	1M-612	PINION, Reverse (16 Teeth)	1
27	1K-614	BUSHING, Reverse Idler Gear	1
28	1M-615	COUNTERSHAFT	1
29	1K-616-A	SHAFT, Transmission Input	1
31	1K-618-B	SPACER, Clutch Coupling	1
33	1K-619	RETAINER, Input Shaft Front Bearing (Order 1KS-619)	1
	1KS-619	RETAINER (1K-619) With Oil Seal (1K-620), Input Shaft Front Bearing	1
35	1K-620	OIL SEAL, Input Shaft Front Bearing	1
36	1K-620-A	WASHER, Input Shaft Front Bearing Felt	1
37	1M-621	GEAR, Transmission Sliding (34 Teeth)	1
38	1K-622	STUD, Input Shaft Front Bearing And Reverse Idler Shaft Bore Cover (3/8 x 1-7/16)	5
39		915 002-4 Nut, 3/8 - 24 Hex	5
40		920 083-4 Lock Washer, 3/8	5
41	1K-623	GASKET, Input Shaft Front Bearing Retainer	1
42	1M-624-A	GEAR, Transmission Sliding (18 Teeth)	1
47	1M-637	SHIM, Countershaft Bearing Cover (.007")	Req.
47	1M-638	SHIM, Countershaft Bearing Cover (.0149")	Req.
47	1M-639	SHIM, Countershaft Bearing Cover (.004")	Req.
48	1M-641	WASHER, Bevel Pinion Shaft	1
49	1M-661	COVER, Platform And Bull Gear	1
50		908 330-4 Cap Screw, 3/8 - 16 x 3/4 Hex Hd	18
51		920 083-4 Lock Washer, 3/8	18
52		908 314-4 Cap Screw, 5/16 - 18 x 5/8 Hex Hd	4
53		920 082-4 Lock Washer, 5/16	4
54	1M-662	GASKET, Bull Gear Cover	1
55	1K-681-B	COVER, Transmission Top	1
56		908 332-4 Cap Screw, 3/8 - 16 x 1 Hex Hd	8
57		908 335-4 Cap Screw, 3/8 - 16 x 1-3/4 Hex Hd	3
58		920 083-4 Lock Washer, 3/8	11
59	1K-682	GASKET, Transmission Top Cover	1
60	1CA-297	CAP, Transmission Filler	1
61	1H-902	PIN, Clutch And Brake Pedal	3

TRANSMISSION, REAR FRAME AND PLATFORM

Ref. No.	Part Number	Description	No. Req.
63	1C-298	GASKET, Transmission Filler Cap	1
65	1K-1011	GASKET, Bevel Pinion Shaft Bearing Cover	1
66	1M-1021	GEAR, Reverse Idler (20 Teeth) (Order 1MS-1021)	1
67	1MS-1021	GEAR (1M-1021) With Bushing (1K-614), Reverse Idler	1
70	1M-1023-A	GEAR, Bevel Pinion Shaft Idler (38 External and 18 Internal Teeth) (Order 1MS-1023-A)	1
70	1MS-1023-A	GEAR (1M-1023-A) With Bushing (1M-610), Bevel Pinion Shaft Idler	1
71	1M-1024	GEAR, Countershaft (37 Teeth)	1
73	1M-1029	COVER, Countershaft Bearing	1
74	1M-1030	SEAL, Countershaft Bearing Cover	1
75	1M-1033	BAFFLE, Transmission Countershaft Oil	1
76	1K-1071	SNAP RING, Countershaft Rear Bearing	1
77	1M-1072	SNAP RING, Bevel Pinion Shaft	1
78	1M-1073	SNAP RING, Bevel Pinion Rear Bearing	1
79	1K-1075	SNAP RING, Transmission Input Shaft	3
80	1K-1077	SHAFT, Reverse Idler	1
81		908 487-4 Cap Screw, 3/8 - 24 x 2-1/2 Hex Hd	1
82		915 635-4 Nut, 3/8 Self Locking	1
85	1M-1078	COVER, Reverse Idler Shaft Bore	1
86	1K-2027	SEAL, "O" Ring Packing (1/8 x 7/8)	1
87	1H-1122	PIN, Brake Pedal Latch Pivot	2
90	1A-1206	SNAP RING, Input Shaft Rear Bearing	1
86	1K-2027	SEAL, "O" Ring Packing (1/8 x 7/8)	1
92	1KS-5003	BEARING, Transmission Input Shaft Ball (New Departure 1208)	2
93	1HS-5004	BEARING, Countershaft Roller (Timken 15101-15250)	2
94	1MS-5004	BEARING, Bevel Pinion Shaft Roller - Front (Timken 2578-2523)	1
95	1MS-5005	BEARING, Bevel Pinion Shaft Roller - Rear (Timken 59175-59413)	1

TRANSMISSION GEAR SHIFT

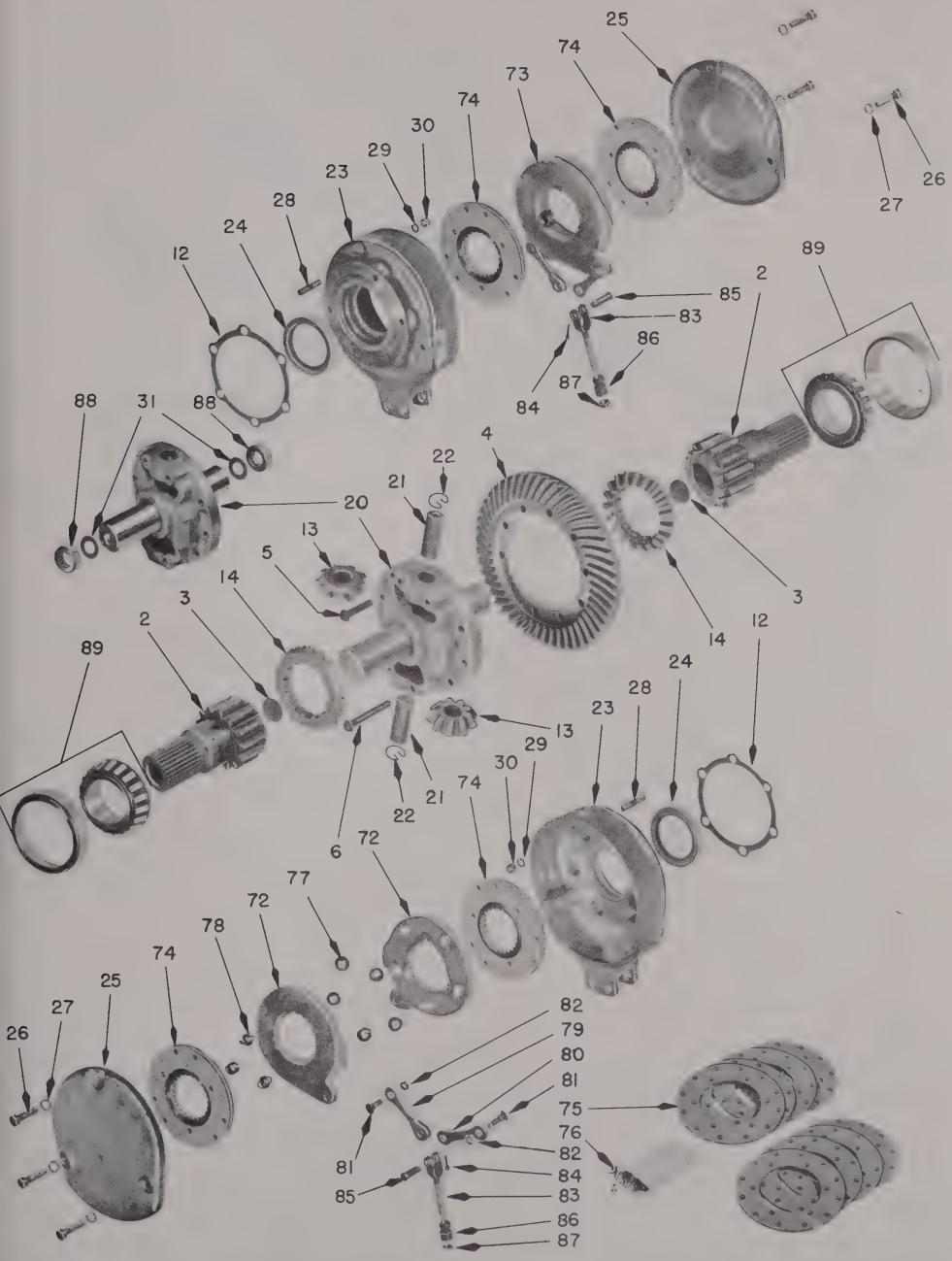


Ref. No.	Part Number	Description	No. Req.
1	100 909-A	SPRING, Gear Shifter Poppet	3
2		S-2328 Ball, 7/16 Dia Hardened Steel	3
3	1K-629	BLOCK, Shifter Poppet	1
4		S-1922 Plug, 1/4 PT Hdless Slotted Pipe	3
5	1K-632	STUD, Shifter Poppet Block (3/8 x 2-1/16)	2
6		920 083-4 Lock Washer, 3/8	2
7		915 002-4 Nut, 3/8 - 24 Hex	2
8	1B-909-A	KNOB, Gear Shift Lever	1
9	1KS-910	LEVER, Gear Shift	1
11	1H-912-A	SPRING, Gear Shift Lever	2
12	1K-914	SOCKET, Gear Shift Lever	1
13		908 333-4 Cap Screw, 3/8 - 16 x 1-1/4 Hex Hd	2
14		920 083-4 Lock Washer, 3/8	2

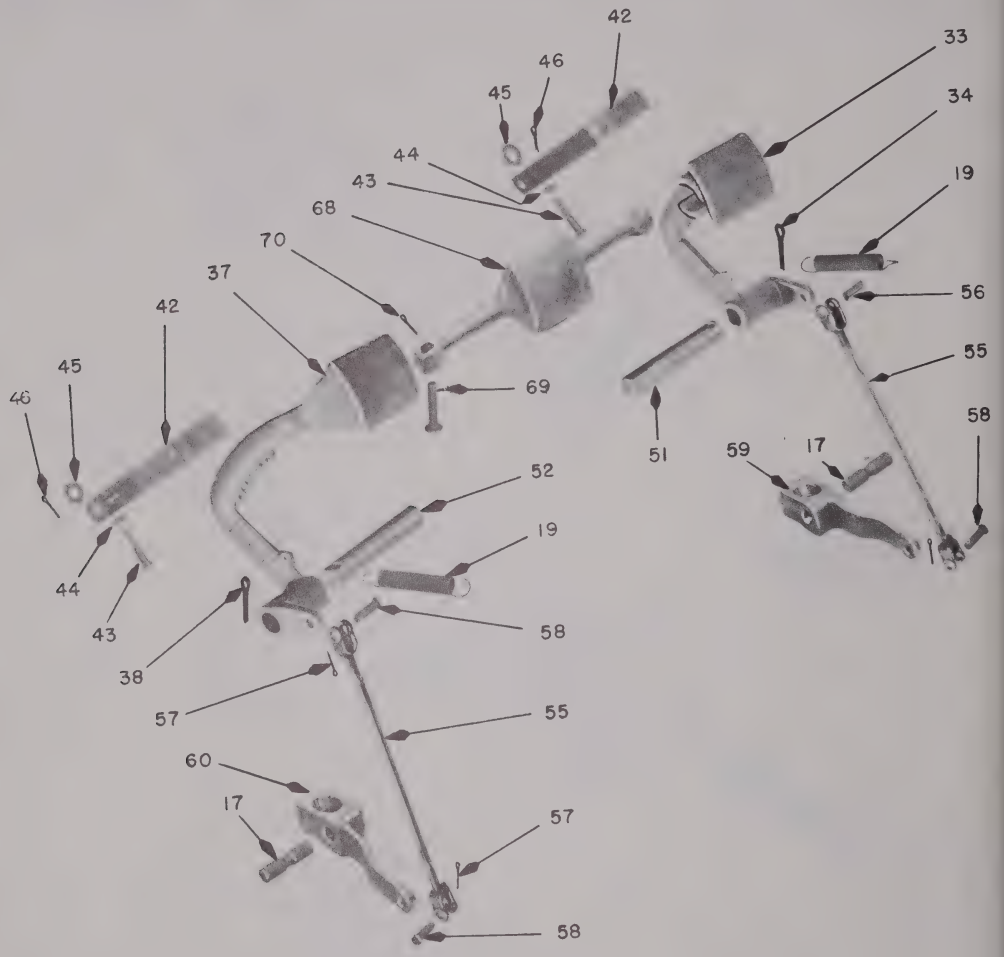
TRANSMISSION GEAR SHIFT

Ref. No.	Part Number	Description	No. Req.
15	1K-915	GASKET, Gear Shift Lever Socket	1
16	1BA-916-A	CAP, Gear Shift Lever Socket	1
17	1H-918	SEAT, Gear Shift Lever Spring	2
18	1H-923	BAFFLE, Shifter Socket Oil	1
19	1K-1601	COVER, Shifter Rod End	1
20	1K-1602	GASKET, Shifter Rod End Cover	1
21	1K-1604	GASKET, Shifter Poppet Block	1
22	1M-1622	ROD, Right Shifter	1
23		932 034 Cotter Pin, 3/16 x 1	1
24	1M-1624	ROD, Left Shifter	1
25		932 034 Cotter Pin, 3/16 x 1	1
26	1MAS-1627	ROD, Center Shifter	1
27		932 034 Cotter Pin, 3/16 x 1	1
28	1M-1629	FORK, Right Shifter	1
29		908 465-4 Cap Screw, 5/16 - 24 x 7/8 Hex Hd	2
30		920 155-4 Lock Washer, 5/16 Internal Tooth	2
31	1M-1630	FORK, Left Shifter	1
32		908 465-4 Cap Screw, 5/16 - 24 x 7/8 Hex Hd	2
33		920 155-4 Lock Washer, 5/16 Internal Tooth	2
34	1K-1631	FORK, Center Shifter	1
35		908 465-4 Cap Screw, 5/16 - 24 x 7/8 Hex Hd	2
36		920 155-4 Lock Washer, 5/16 Internal Tooth	2
37	1KS-1634-A	SUPPORT, Interlock Yoke	1
38		908 331-4 Cap Screw, 3/8 - 16 x 7/8 Hex Hd	2
39		920 156-4 Lock Washer, 3/8 Internal Tooth	2

DIFFERENTIAL, BRAKE AND BRAKE CONTROLS



DIFFERENTIAL, BRAKE AND BRAKE CONTROLS



Ref. No.	Part Number	Description	No. Req.
2	1MS-643-B	PINION With Plug (935 024), Differential Bull	2
3		935 024 Plug, 1-5/8 Dia Expansion	2
4	1M-644-B	GEAR, Bevel Drive (50 Teeth) (See 1MSR-602-B)	1
5		S-669 Rivet, 7/16 x 1-3/4 Button Hd	6
6		S-689 Rivet, 7/16 x 3 Button Hd	4
12	1M-650	SHIM, Differential Bearing Cover (.007")	6
12	1M-651	SHIM, Differential Bearing Cover (.0149")	4

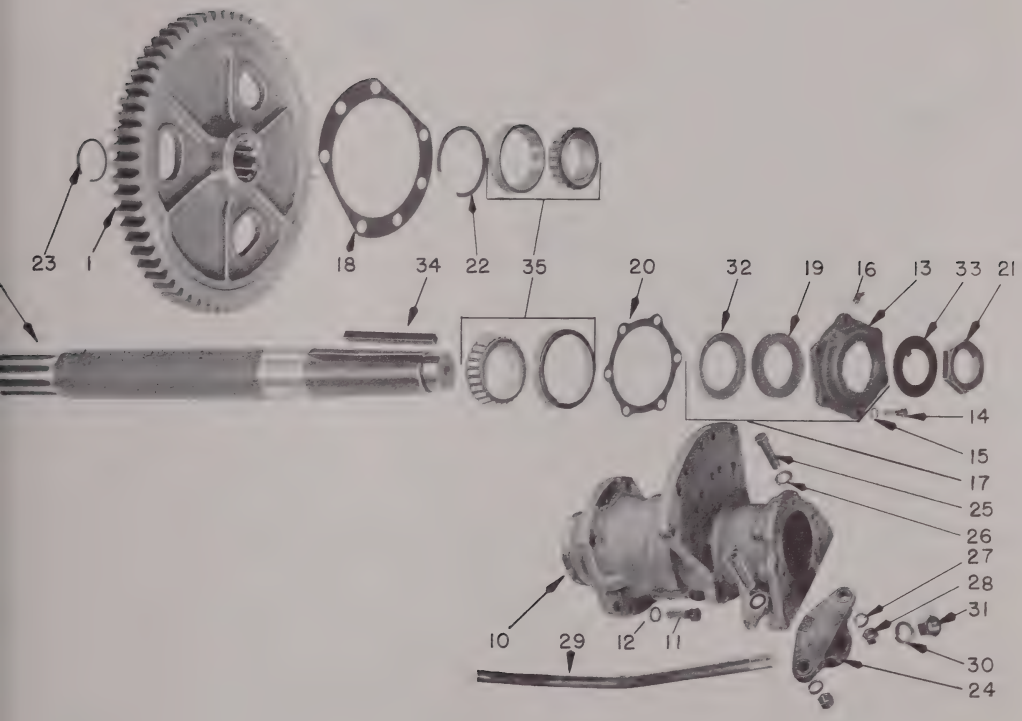
DIFFERENTIAL, BRAKE AND BRAKE CONTROLS

Ref. No.	Part Number	Description	No. Req.
12	1M-652	SHIM, Differential Bearing Cover (.004")	6
13	1M-654	PINION, Differential (9 Teeth)	2
14	1M-655	GEAR, Differential (19 Teeth)	2
17	1K-901	PIN, Brake Lever Pivot	2
19	1J-957	SPRING, Brake Pedal	2
20	1MS-1100-A	SHAFT AND SPIDER Assembly, Differential	1
	1MSA-1100-E	DIFFERENTIAL Assembly (50 Teeth Bevel)	1
21	1M-1101	PIN, Differential Pinion	2
22	1M-1102	RING, Differential Pinion Pin Retaining	2
23	1M-1104-A	HOUSING, Brake	2
24	1M-1110	OIL SEAL, Differential Bearing	2
25	1K-1112-A	COVER, Disc Brake	2
26		908 358-4 Cap Screw, 1/2 - 13 x 1-3/4 Hex Hd	6
27		920 085-4 Lock Washer, 1/2	6
28	1K-1115-B	STUD, Brake Housing	10
29		920 084-4 Lock Washer, 7/16	10
30		915 003-4 Nut, 7/16 - 20 Hex	10
31	1M-1116-A	SHIM, Differential Thrust Bearing (.0149")	4
31	1M-1116-B	SHIM, Differential Thrust Bearing (.007")	6
31	1M-1116-C	SHIM, Differential Thrust Bearing (.004")	6
33	1M-1119-A	PEDAL, Brake - Right	1
34		932 045 Cotter Pin, 1/4 x 1-1/4	1
37	1M-1120-A	PEDAL, Brake - Left	1
38		932 045 Cotter Pin, 1/4 x 1-1/4	1
42	1KS-1121-C	LATCH Assembly, Brake Pedal	2
43		908 321-4 Cap Screw, 5/16 - 18 x 2 Hex Hd	2
44		915 235-4 Nut, 5/16 - 18 Hex Jam	2
45		920 010-4 Washer, 7/16 Plain	2
46		932 008 Cotter Pin, 3/32 x 3/4	2
51	1K-1124-B	PIN, Brake Pedal Pivot - Right	1
52	1K-1124-C	PIN, Brake Pedal Pivot - Left	1
55	1MS-1125-C	ROD, Brake	2
56		S-1365 Roll Pin, 3/8 x 15/16	1
57		932 008 Cotter Pin, 3/32 x 3/4	3
58		932 122 Pin, 3/8 Rod End	3
59	1M-1413-A	LEVER, Brake Actuating - Right	1
60	1M-1413-B	LEVER, Brake Actuating - Left	1
68	1M-1430-B	BAR, Brake Equalizer	1
69	1K-1431	PIN, Brake Equalizer Bar	1
70		932 008 Cotter Pin, 3/32 x 3/4	1
72	1K-2602	DISC, Actuating	4
73	1KS-2602	DISC Assembly, Actuating	2
74	1KS-2603	DISC AND LININGS, Middle	4
75	1K-2604	LINING (Order 1KS-2604)	8
	1KS-2604	PACKAGE, Linings and Rivets	1

DIFFERENTIAL, BRAKE AND BRAKE CONTROLS

Ref. No.	Part Number	Description	No. Req.
76	7A-2605	RIVET	72
77	7A-2606	BALL - 7/8 Diameter	10
78	1K-2608	SPRING, Extension	6
79	1KA-2609	LINK, Actuating - Yoke	2
80	1K-2610	LINK, Actuating - Plain	2
81	1K-2612	STUD	4
82		915 085 Nut, 3/8 - 24 Hex Jam	4
83	1K-2615	ROD, Brake Actuating	2
84		932 016 Cotter Pin, 1/8 x 3/4	2
85		932 124 Pin, 1/2 Rod End	2
86	1K-2617	NUT, Brake Adjusting	2
87		915 087-4 Nut, 1/2 - 20 Hex Jam	2
88	1MS-5020	BEARING, Differential Ball Thrust (Aetna E-10)	2
89	1KS-5021	BEARING, Differential Roller (Timken 3984-3925)	2

REAR AXLE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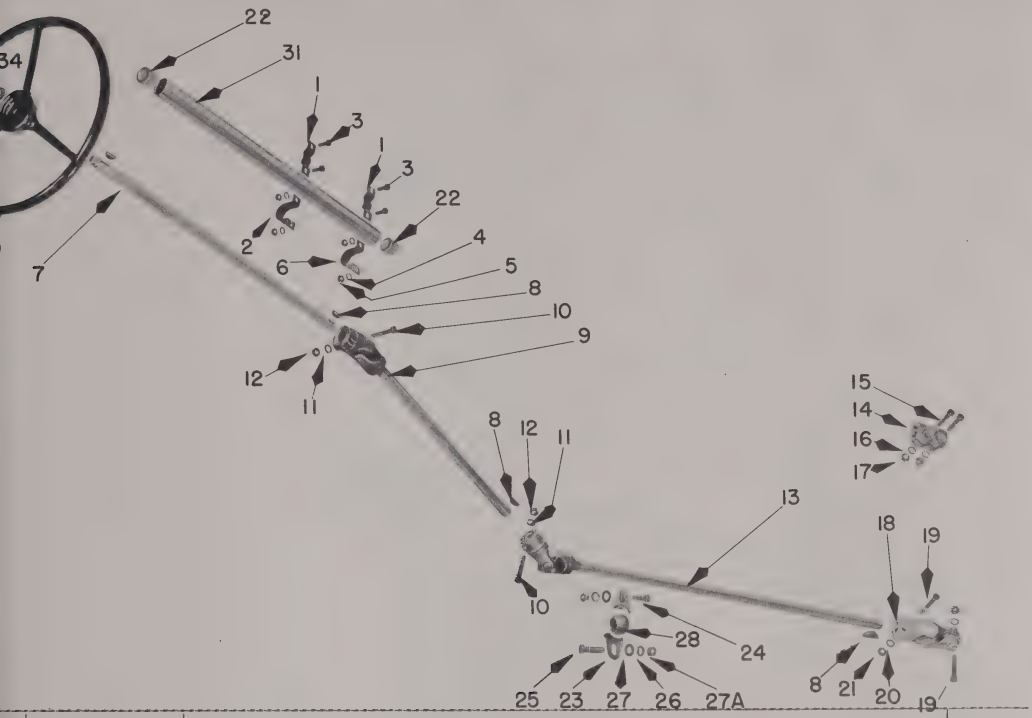
REAR AXLE

Ref. No.	Part Number	Description	No. Req.
1	1MS-657-B	**GEAR AND SPIDER,** Bull	2
3	1MA-699-E	**AXLE,** Rear	2
10	1M-700-E	**CARRIER,** Rear Axle	2
11		908 386-4 Cap Screw, 5/8 - 11 x 2 Hex Hd	14
12		920 087-4 Lock Washer, 5/8	14
13	1M-701-A	**CAP,** Rear Axle Bearing (Order 1MS-701-A)	2
14		908 333-4 Cap Screw, 3/8 - 16 x 1-1/4 Hex Hd	12
15		920 083-4 Lock Washer, 3/8	12
16		939 018 Fitting, 1/8 PT x 85°	2
17	1MS-701-A	**CAP** (1M-701-A) With Oil Seal (1M-1443) And Felt Washer (1M-703), Rear Axle Bearing	2
18	1M-702	**GASKET,** Rear Axle Carrier	2
19	1M-703	**WASHER,** Rear Axle Bearing Cap Felt	2
20	1K-707	**SHIM,** Rear Axle Bearing Cap (.007")	Req.
20	1K-708	**SHIM,** Rear Axle Bearing Cap (.0149")	Req.
20	1K-709	**SHIM,** Rear Axle Bearing Cap (.004")	Req.
21	1F-711-A	**NUT,** Rear Axle	2
22	1B-1028-B	**SNAP RING,** Rear Axle Inner Bearing	2
23	1K-1142	**SNAP RING,** Rear Axle	2
24	1K-1230	**BRACKET,** Truss Rod	2
25		908 564-4 Cap Screw, 7/8 - 14 x 3 Hex Hd	4
26		920 016-4 Washer, 7/8 Plain	4
27		920 091-4 Lock Washer, 7/8	4
28		915 008-4 Nut, 7/8 - 14 Hex	4
29	1M-1231	**ROD,** Rear Axle Carrier Truss	1
30		920 097-4 Lock Washer, 1-1/4	2
31		915 011-4 Nut, 1-1/4 - 12 Hex	2
32	1M-1443	**OIL SEAL,** Rear Axle	2
33	1F-1449	**LOCK WASHER,** Rear Axle Nut	2
34	1F-1451-A	**KEY,** Rear Axle	2
35	1MS-5012-A	**BEARING,** Rear Axle Roller (Timken 395S-394A)	4

STEERING WHEEL AND SHAFTS

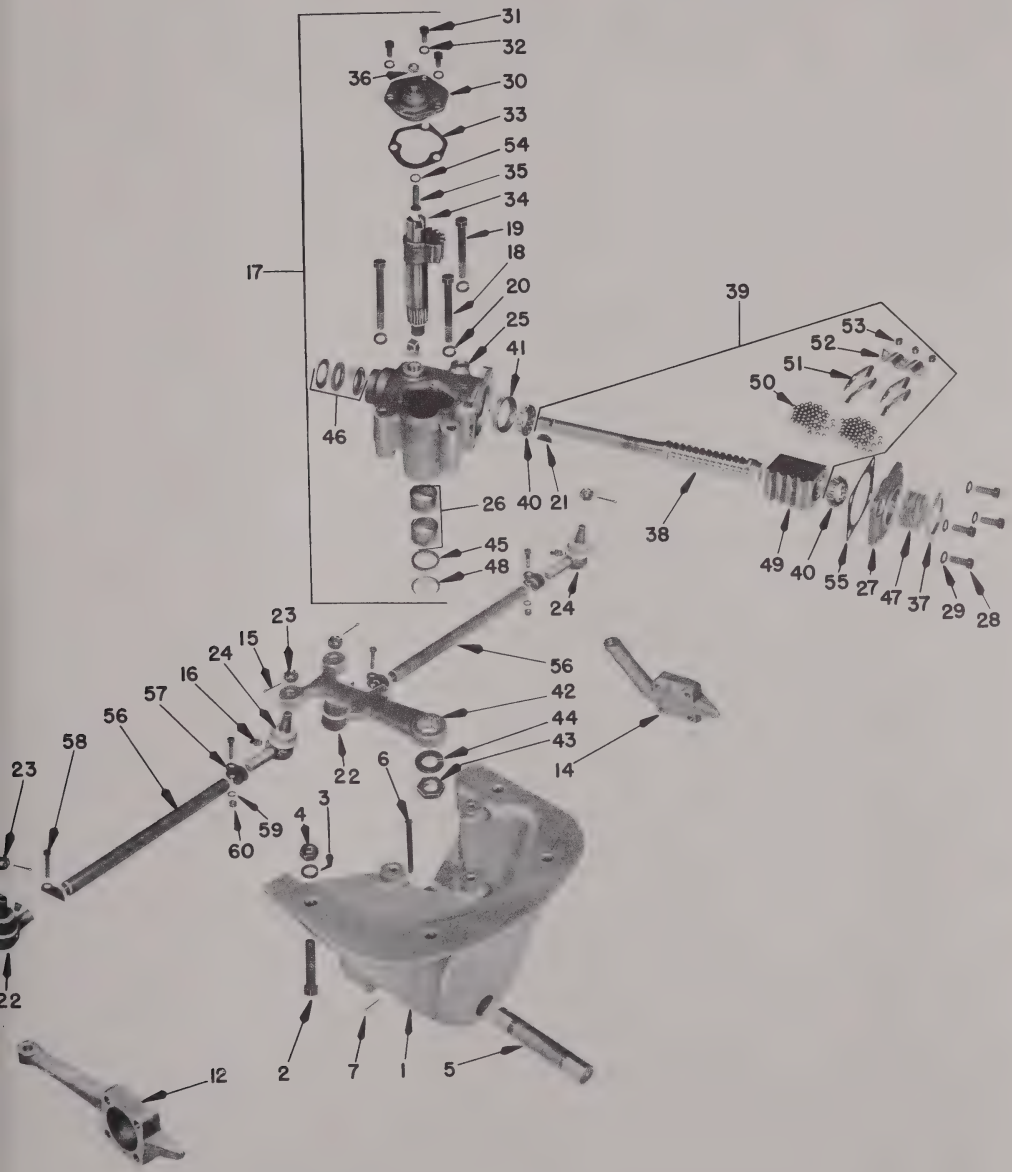


Part Number	Description	No. Req.
1K-751	SPACER, Steering Column Support	2
1K-751-A	CLAMP, Steering Column - Upper	1
	908 332-4 Cap Screw, 3/8 - 16 x 1 Hex Hd	2
	920 083-4 Lock Washer, 3/8	2
	915 113-4 Nut, 3/8 - 16 Hex	2
1K-751-B	CLAMP, Steering Column - Lower	1
	908 332-4 Cap Screw, 3/8 - 16 x 1 Hex Hd	2
	920 083-4 Lock Washer, 3/8	2
	915 113-4 Nut, 3/8 - 16 Hex	2
1K-753	SHAFT, Steering Wheel	1
	937 020 Key, 3/16 x 1 Woodruff	1
1KBS-753-A	SHAFT AND UNIVERSAL JOINT, Center Steering (22" overall length)	1
	937 020 Key, 3/16 x 1 Woodruff	1
	908 336-4 Cap Screw, 3/8 - 16 x 2 Hex Hd	1
	920 083-4 Lock Washer, 3/8	1
	915 113-4 Nut, 3/8 - 16 Hex	1
1KAS-753-E	SHAFT AND UNIVERSAL JOINT, Front Steering (30-25/32" overall length) (Same Hardware Material as 1KBS-753-A)	1
1KA-758	JOINT, Steering Shaft Universal - Front	1
	908 336-4 Cap Screw, 3/8 - 16 x 2 Hex Hd	2
	920 083-4 Lock Washer, 3/8	2
	915 113-4 Nut, 3/8 - 16 Hex	2
1H-761	BUSHING, Steering Column	2

STEERING WHEEL AND SHAFTS

Ref. No.	Part Number	Description	No. Req.
23	1K-762-B	SUPPORT, Steering Shaft Bearing	2
24		908 331-4 Cap Screw, 3/8 - 16 x 7/8 Hex Hd	1
25		908 334-4 Cap Screw, 3/8 - 16 x 1-1/2	1
26		920 083-4 Lock Washer, 3/8	2
27		920 009-4 Washer, 3/8 Plain	2
27A		915 113-4 Nut, 3/8 - 16 Hex	2
28	1K-763	BEARING, Steering Shaft (Self Aligning)	1
29	1B-767-C	WHEEL, Steering	1
30		915 090-4 Nut, 3/4 - 16 Hex Jam	1
31	1K-768	COLUMN, Steering (Order 1KS-768)	1
	1KS-768	COLUMN (1K-768) With Bushing (1H-761), Steering	1
34	1E-1082	CAP, Steering Wheel	1
35		S-2595-4 Screw, 1/4 - 20 x 5/8 Truss Hd Mach	1

FRONT STEERING MECHANISM



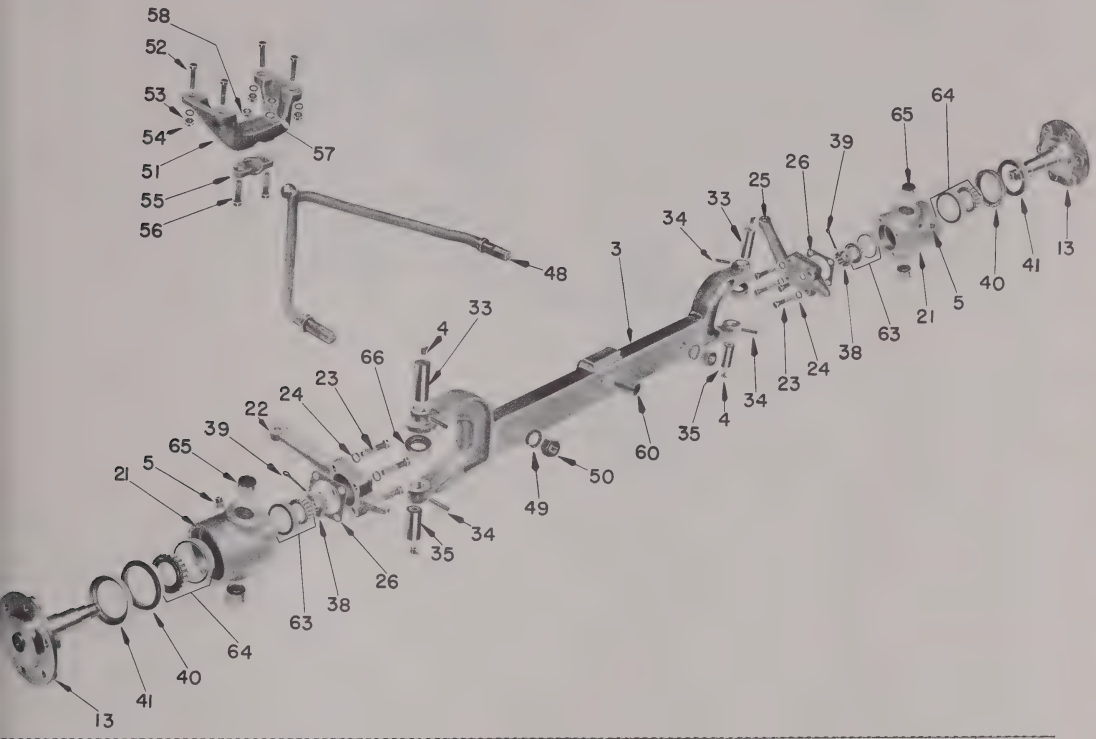
FRONT STEERING MECHANISM

Ref. No.	Part Number	Description	No. Req.
1	1K-501-D	BOLSTER, Front Axle	1
2		908 388-4 Cap Screw, 5/8 - 11 x 2-1/2 Hex Hd	1
2		908 389-4 Cap Screw, 5/8 - 11 x 2-3/4 Hex Hd	3
3		920 087-4 Lock Washer, 5/8	4
4		915 117-4 Nut, 5/8 - 11 Hex	4
5	1K-502-C	PIVOT, Front Axle	1
6	1K-503	PIN, Axle Pivot	1
7		932 008 Cotter Pin, 3/32 x 3/4	1
12	1K-715-F	ARM, Right Steering Knuckle	1
14	1K-717-F	ARM, Left Steering Knuckle	1
	1KAS-724-H	ROD Assembly, Steering Knuckle Tie	2
15		932 009 Cotter Pin, 3/32 x 1	4
16		939 001 Fitting, 1/8 PT Hydr Strt Grease	4
17	1KS-750-B	GEAR Assembly, Steering (Saginaw)	1
18		S-3150-4 Cap Screw, 1/2 - 13 x 4-1/4 Hex Hd	2
19		908 366-4 Cap Screw, 1/2 - 13 x 3-3/4 Hex Hd	1
20		920 085-4 Lock Washer, 1/2	3
21		937 020 Key, 3/16 Woodruff	1
22	1KS-1160	SOCKET Assembly, Tie Rod (RH Thread)	2
23		915 033 Nut, 9/16 - 18 Hex	2
24	1KS-1161	SOCKET Assembly, Tie Rod (LH Thread)	2
23		915 033 Nut, 9/16 - 18 Hex	2
25	1K-6750-B	HOUSING, Saginaw Steering Gear (Order 1KS-6750-B)	1
	1KS-6750-B	HOUSING (1K-6750-B) With Bushing (1K-6752-A), Saginaw Steering Gear	1
		S-1900 Plug, 1/2 Std Steel Pipe	1
26	1K-6752-A	BUSHING, Saginaw Pitman Shaft (Steering Gear Housing)	1
27	1A-6753-A	COVER, Saginaw Housing End	1
28		S-1073 Cap Screw, 7/16 - 14 x 1-1/8 Hex Hd	4
29		920 084 Lock Washer, 7/16	4
30	1A-6756-A	COVER, Saginaw Housing Side (Order 1AS-6756-A)	1
	1AS-6756-A	COVER (1A-6756-A) With Bushing (1A-6787-A), Saginaw Housing Side	1
31		908 330 Cap Screw, 3/8 - 16 x 3/4 Hex Hd	3
32		920 083 Lock Washer, 3/8	3
33	1A-6757-A	GASKET, Saginaw Side Cover	1
34	1K-6758-A	SHAFT AND GEAR, Saginaw Pitman	1
35	1A-6763-A	ADJUSTER, Saginaw Lash	1
36		915 086 Nut, 7/16 - 20 Hex Jam	1
37	1A-6765-A	NUT, Saginaw Worm Bearing Adjuster Lock	1
38	1KS-6767-A	SHAFT AND WORM Assembly, Saginaw Steering	1
39	1KSA-6767-A	SHAFT AND BALL NUT Assembly, Saginaw Steering	1
40	1A-6769	BEARING, Saginaw Worm Thrust	2
41	1A-6770	CUP, Saginaw Worm Thrust Bearing	1
42	1K-6772-B	ARM, Saginaw Pitman Steering Sector	1
43	1A-6774-A	NUT, Saginaw Pitman Arm	1
44	1A-6775-A	LOCK WASHER, Saginaw Pitman Arm	1
45	1K-6784	PACKING, Saginaw Pitman Shaft	1
	1A-6787-A	BUSHING, Saginaw Pitman Shaft Side Cover (Order 1AS-6756-A) (Not furnished separately for repairs.	1

FRONT STEERING MECHANISM

Ref. No.	Part Number	Description	No. Req.
46	1K-6803-A	SEAL, Saginaw Steering Shaft	1
47	1A-6817	ADJUSTER, Saginaw Steering Worm Bearing	1
48	1A-6818	RETAINER, Saginaw Pitman Shaft Packing	1
49	1K-6819	NUT, Saginaw Ball	1
50		S-3741 Ball, 9/32 Dia Hardened Steel	106
51	1K-6820	GUIDE, Saginaw Ball Return	4
52	1K-6821	CLAMP, Saginaw Ball Return Guide	1
53		S-2560 Fastener Unit, 1/4 - 28 x 5/16 Sems	3
54	1AS-6822	KIT, Saginaw Lash Adjuster Shim	1
55	1A-6823	GASKET, Saginaw End Cover	1
56	1K-6958-E	ROD, Steering Knuckle Intermediate	2
57	1K-6959-A	CLAMP, Steering Knuckle Tie Rod	4
58	1K-6960-A	BOLT, Tie Rod Clamp	2
59		920 083 Lock Washer, 3/8	2
60		915 002 Nut, 3/8 - 24 Hex	2

FRONT AXLE

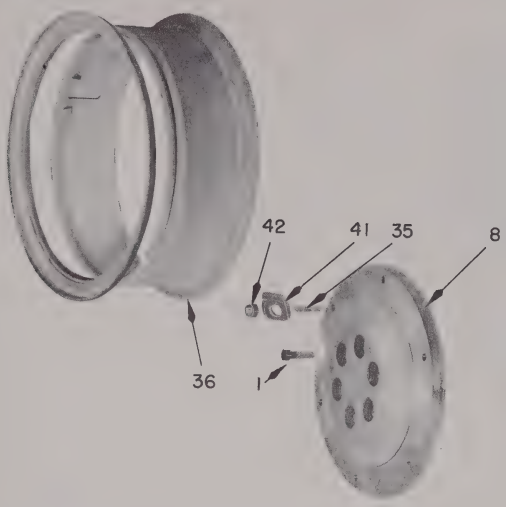


Ref. No.	Part Number	Description	No. Req.
3	1KAS-712-J	AXLE With Bushing (1K-748-D), Front	1
	1KASA-712-J	AXLE Assembly, Front	1
4		939 017 Fitting, 1/8 x 67-1/2° Grease	4
5		S-1905 Plug, 3/8 Std Pipe	2
13	1K-713-G	SPINDLE, Steering Knuckle	2
21	1K-714-C	CARRIER, Front Axle Spindle	2
22	1K-715-F	ARM, Right Steering Knuckle	1
23		908 360-4 Cap Screw, 1/2 - 13 x 2-1/4 Hex Hd	4
24		920 085-4 Lock Washer, 1/2	4
25	1K-717-F	ARM, Left Steering Knuckle	1
23		908 360-4 Cap Screw, 1/2 - 13 x 2-1/4 Hex Hd	4
24		920 085-4 Lock Washer, 1/2	4
26	1K-718-A	GASKET, Steering Knuckle Spindle Carrier	2
33	1K-720-A	PIVOT, Spindle Carrier - Upper	2
34		S-1379 Roll Pin, 3/8 x 1-3/4	2
35	1K-720-B	PIVOT, Spindle Carrier - Lower	2
34		S-1379 Roll Pin, 3/8 x 1-3/4	2
38	1K-731-A	NUT, Steering Knuckle Spindle	2
39		932 048 Cotter Pin, 1/4 x 2	2

FRONT AXLE

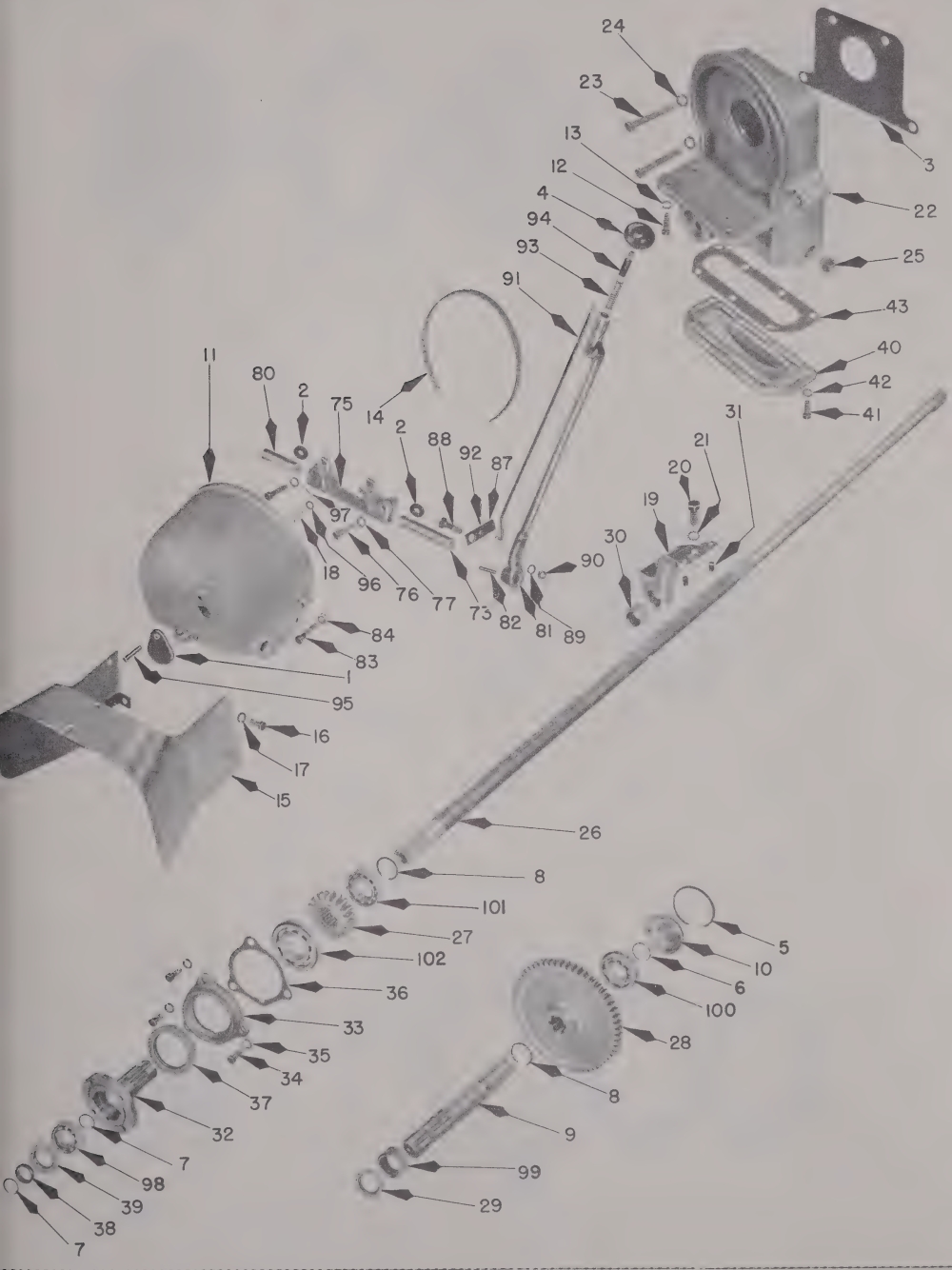
Ref. No.	Part Number	Description	No. Req.
40	1K-737-A	SEAL, Front Wheel	2
41	1K-738-A	CUP, Front Wheel Seal Wearing	2
48	1KS-741-F	ROD Assembly, Front Axle Stay	1
49		920 097-4 Lock Washer, 1-1/4	2
50		915 011-4 Nut, 1-1/4 - 12 Hex	2
51	1K-743	SOCKET, Stay Rod Ball	1
52		908 390-4 Cap Screw, 5/8 - 11 x 3 Hex Hd	4
53		920 087-4 Lock Washer, 5/8	4
54		915 117-4 Nut, 5/8 - 11 Hex	4
55	1A-744	CAP, Stay Rod Ball Socket	1
56		908 403-4 Cap Screw, 3/4 - 10 x 3 Hex Hd	2
57		920 089-4 Lock Washer, 3/4	2
58		915 118-4 Nut, 3/4 - 10 Hex	2
60	1K-748-D	BUSHING, Front Axle Pivot	1
63	1KS-5013	BEARING, Front Wheel Roller - Inner (Timken 14138A-14274)	2
64	1KS-5014	BEARING, Front Wheel Roller - Outer (Timken 28580-28521)	2
65	1KS-5038	BEARING, Needle Roller (Torrington M-20201)	4
66	1KS-5039	BEARING, Roller Thrust (Timken T-126)	2

FRONT WHEELS

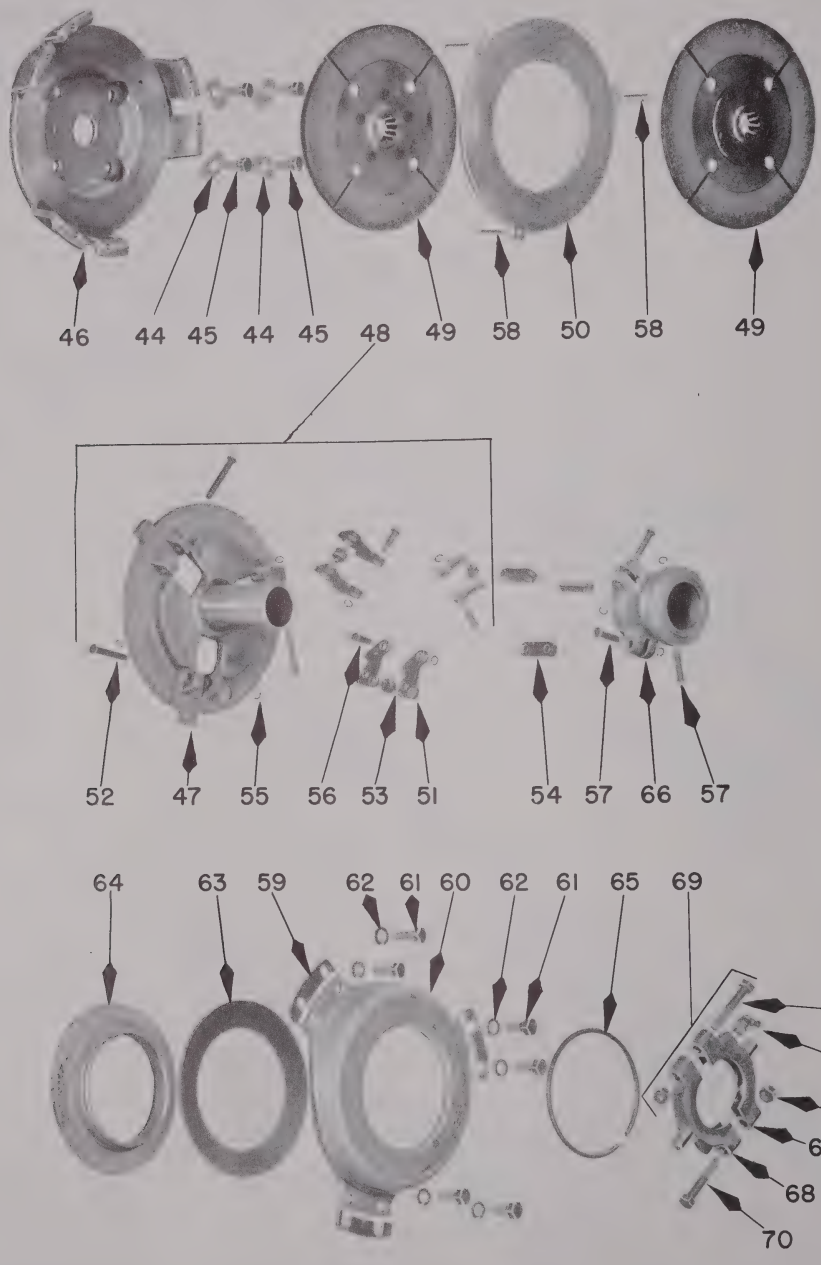


Ref. No.	Part Number	Description	No. Req.
1	1K-706	BOLT, Wheel	12
8	1K-729-F	WHEEL, Front	2
35	1D-7006	STUD, Rim Clamp	12
36	1KS-7009-C	RIM Assembly, Front Wheel (5.50-20 Tires)	2
41	1K-7011-C	CLAMP, Rim	12
42		915 439-4 Nut, 5/8 - 11 Hex	12

POWER TAKE-OFF



POWER TAKE-OFF



POWER TAKE-OFF

Ref. No.	Part Number	Description	No. Req.
1	1K-473	COVER, Grease Hole	1
2	1B-583	KEY, Clutch Release Fork	2
3	1K-635-A	GASKET, Housing	1
4	1B-909-A	KNOB, Shift Lever	1
5	1B-1071	SNAP RING, Shaft Front Bearing Retainer	1
6	1L-1072	SNAP RING, Shaft Front Bearing	1
7	1B-1073	SNAP RING, Drive Shaft	2
8	1L-1075	SNAP RING, Clutch Mounting Sleeve and Power Take-Off Shaft - Rear	2
9	1K-1200	SHAFT, Power Take-Off	1
10	1K-1204	COVER, Front Bearing	1
11	1K-1205-B	COVER	1
12		S-3071-4 Cap Screw, 3/8 - 16 x 1-1/8 Hex Hd	4
13		920 083-4 Lock Washer, 3/8	4
14	1K-1206	SEAL, Cover	1
15	1KS-1208	SHIELD	1
16		908 330-4 Cap Screw, 3/8 - 16 x 3/4 Hex Hd	5
17		920 083-4 Lock Washer, 3/8	5
18	1B-1381-A	SPRING, Grease Hole Cover	1
19	1K-1562	SUPPORT, Drive Shaft (Order 1KS-1562)	1
	1KS-1562	SUPPORT (1K-1562) With Bushing (1K-1583) And Dowels (1K-1584), Drive Shaft	1
20		908 356-4 Cap Screw, 1/2 - 13 x 1-1/4 Hex Hd	1
21		920 158-4 Lock Washer, 1/2 Internal Tooth	1
22	1K-1570	HOUSING	1
23		908 364-4 Cap Screw, 1/2 - 13 x 3-1/4 Hex Hd	4
24		920 085-4 Lock Washer, 1/2	4
25		S-1901 Plug, 3/4 Std Pipe	1
26	1MA-1571-A	SHAFT, Drive	1
27	1K-1572	PINION (19 Teeth)	1
28	1K-1573	GEAR (57 Teeth)	1
29	1K-1582	OIL SEAL, Shaft	1
30	1K-1583	BUSHING, Drive Shaft	1
31	1K-1584	DOWEL PIN, Shaft (3/8 x 5/8)	2
32	1K-1585	SLEEVE, Clutch Mounting	1
33	1K-1586	RETAINER, Clutch Mounting Sleeve Bearing (Order 1KS-1586)	1
	1KS-1586	RETAINER With Oil Seal (1K-1588), Clutch Mounting Sleeve Bearing	1
34		908 331-4 Cap Screw, 3/8 - 16 x 7/8 Hex Hd	3
35		920 083-4 Lock Washer, 3/8	3
36	1K-1587	GASKET, Clutch Mounting Sleeve Bearing Retainer	1
37	1K-1588	OIL SEAL, Clutch Mounting Sleeve	1
38	1K-1589	SPACER, Drive Shaft Bearing	1
39	1K-1590	OIL SEAL, Drive Shaft	1
40	1K-1592	COVER, Lower	1
41		908 330-4 Cap Screw, 3/8 - 16 x 3/4 Hex Hd	7
42		920 083-4 Lock Washer, 3/8	7

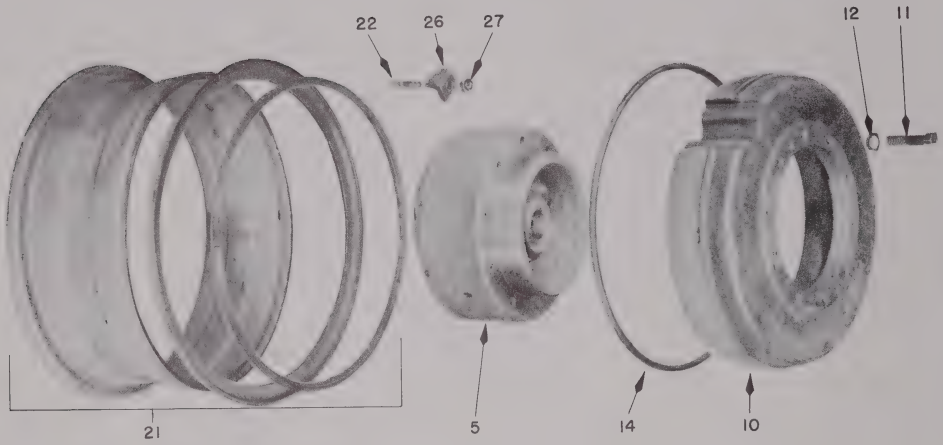
POWER TAKE-OFF

Ref. No.	Part Number	Description	No. Req.
43	1K-1593	GASKET, Lower Cover	1
44	1K-1649	LOCK WASHER, Mounting Screw	4
	1KS-1650	CLUTCH Assembly	1
45		908 479-4 Cap Screw, 3/8 - 24 x 3/4 Hex Hd	4
46	1K-1651	HOUSING, Clutch	1
47	1KS-1655	PLATE, Clutch Pressure	1
48	1KSA-1655	PLATE With Lever, Clutch Pressure	1
49	1KS-1656	PLATE AND FACINGS, Clutch Drive	2
50	1K-1657	PLATE, Clutch Center	1
51	1K-1659	LEVER, Clutch Pressure Plate	6
52	1K-1660	PIN, Clutch Pressure Plate Lever	3
53	1K-1661	ROLLER, Clutch Lever	3
54	1K-1662	LINK, Clutch Pressure Plate Connecting	3
55	1K-1663	RING, Clutch Pressure Plate Retaining	9
56	1K-1664	PIN, Clutch Pressure Plate Connecting Link (Short)	3
57	1K-1664-A	PIN, Clutch Connecting Link (Long)	3
58	1K-1665-A	SPRING, Clutch Pressure	3
59	1KSR-1666	SHIM SET, Clutch Back Plate	3
60	1K-1667	PLATE, Back (Order 1KS-1667)	1
	1KS-1667	PLATE Assembly, Clutch Back	1
61		908 463 Cap Screw, 5/16 - 24 x 5/8 Hex Hd	6
62		920 082 Lock Washer, 5/16	6
63	1K-1668-B	WASHER, Clutch Pressure	1
64	1K-1669	PLATE, Clutch Washer	1
65	1K-1670	SNAP RING, Clutch Washer Plate	1
66	1K-1671	SLEEVE, Clutch Release Bearing (Order 1KS-1671)	1
	1KS-1671	SLEEVE (1K-1671) And Bearing (1KS-1673), Clutch Release Bearing	1
67	1K-1672	BEARING, Clutch Release - RH (Order 1KS-1673)	1
68	1K-1673	BEARING, Clutch Release - LH (Order 1KS-1673)	1
69	1KS-1673	BEARING, Clutch Release	1
70		908 469 Cap Screw, 5/16 - 24 x 1-3/4 Hex Hd	2
71		915 634 Nut, 5/16 - 24 Elastic Stop	2
72		939 017 Fitting, 1/8 PT x 67-1/2° Hydr Alemite	1
73	1K-1681-B	SHAFT, Clutch Release	1
75	1K-1682-A	FORK, Clutch Release	1
76		908 333-4 Cap Screw, 3/8 - 16 x 1-1/4 Hex Hd	2
77		920 083-4 Lock Washer, 3/8	2
80	1K-1683-A	PIVOT, Clutch Release Yoke	1
81	1KS-1686-B	LEVER Assembly, Clutch Release	1
82		932 555 Groov-Pin, 5/16 x 1-1/2	1
83		908 336-4 Cap Screw, 3/8 - 16 x 2 Hex Hd	1
84		915 236-4 Nut, 3/8 - 16 Hex Jam	1
87	1K-1687	LATCH, Clutch Lever	1

POWER TAKE-OFF

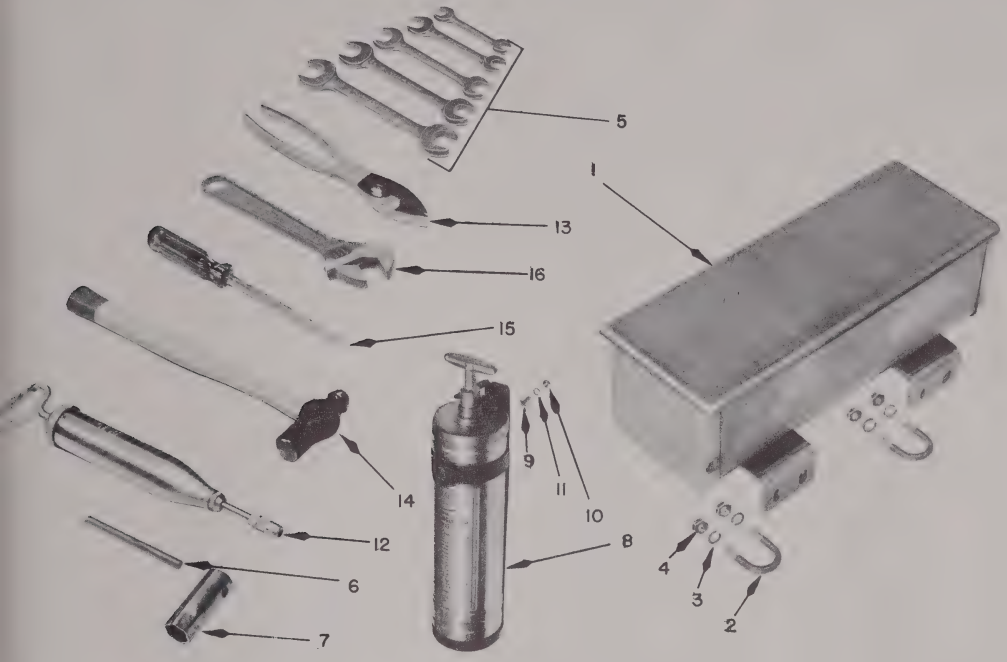
Ref. No.	Part Number	Description	No. Req.
88	1K-1688-A	**BOLT,** Clutch Lever Latch	1
89		920 083-4 Lock Washer, 3/8	1
90		915 085-4 Nut, 3/8 - 24 Hex Jam	1
91	1K-1689-A	**ROD,** Clutch Lever	1
92		932 008 Cotter Pin, 3/32 x 3/4	2
93	1K-1690	**SPRING,** Clutch Release Lever	1
94	1K-1691	**PLUNGER,** Clutch Lever	1
95	1K-1692	**PIN,** Grease Hole Cover	1
96		920 008-4 Washer, 5/16 Plain	2
97		932 008 Cotter Pin, 3/32 x 3/4	1
98	1CS-5010	**BEARING,** Drive Shaft Ball (SKF 6205-Z)	1
99	1KS-5016	**BEARING,** Shaft Rear (Torrington BH-2216-OH)	1
100	1KS-5026	**BEARING,** Shaft Front (SKF 6206NR)	1
101	1KS-5030-A	**BEARING,** Clutch Mounting Sleeve Ball-Front (ND 93L07) (SKF 6007-XARS)	1
102	1KS-5031	**BEARING,** Clutch Mounting Sleeve Ball - Rear (SKF 6208 ZNR)	1

REAR WHEELS



Ref. No.	Part Number	Description	No. Req.
5	1M-705-C	WHEEL, Rear	2
10	1K-1225	RING, Rear Wheel Rim Support	2
11		S-3118-4 Cap Screw, 3/4 - 10 x 3-1/4 Hex Hd	20
12		920 089-4 Lock Washer, 3/4	20
14	1K-1228	RING, Rear Wheel Rim Locating	2
21	1DS-7002-C	RIM Assembly, Rear Wheel Tire	2
22	1D-7006-A	STUD, Rear Wheel Rim Clamp	16
26	1D-7011-B	CLAMP, Rear Wheel Rim	16
27	1K-7012	NUT, Rim Clamp	16

TOOLS AND TOOL BOX



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1	1MS-876-C	BOX Assembly, Tool	1
2	1K-877	U-BOLT, Tool Box Support	2
3		920 082-4 Lock Washer, 5/16	4
4		915 148-4 Nut, 5/16 - 18 Hex	4
5	1CS-994	WRENCH SET, Five Piece	1
6	1C-988-A	HANDLE, Spark Plug Wrench	1
7	1K-989	WRENCH, Spark Plug	1
8	1M-1331	EXTINGUISHER, Fire	1
9		909 001-4 Screw, No. 8 - 32 x 9/16 Mach	6
10		915 537-4 Nut, No. 8 - 32 Hex	6
11		920 078-4 Lock Washer, No. 8	6
	1MS-1332	EYE Assembly, Lifting - Front (Not Illustrated)	2
		908 386-4 Cap Screw, 5/8 - 11 x 2 Hex Hd	8
		920 087-4 Lock Washer, 5/8	8
	1M-1337	EYE, Lifting - Rear (Not Illustrated)	2
		908 534-4 Cap Screw, 5/8 - 18 x 1-3/4 Hex Hd	4
		920 087-4 Lock Washer, 5/8	4
		915 006-4 Nut, 5/8 - 18 Hex	4
12	S-1661	GUN, Hand Grease	1
13	1D-5215	PLIERS - 10"	1
14	1D-5216-A	HAMMER, Ball Peen - 1 lb.	1

TOOLS AND TOOL BOX

Ref. No.	Part Number	Description	No. Req.
15	1A-5217	SCREW DRIVER	1
16	1A-5219	WRENCH, Adjustable - 10"	1

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OLIVER

OPERATOR'S MANUAL

Agricultural and Industrial

Super "77" and Super "88"

Tractors

THE OLIVER CORPORATION

THE OLIVER CORPORATION

CHARLES CITY, IOWA • • • • U. S. A.

PRINTED IN U. S. A.

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S1-4-M12, K12

SUPER "77" AND SUPER "88" LEADERS IN THEIR FIELD

We, of THE OLIVER CORPORATION, are proud to present to you the SUPER "77" and SUPER "88" as new members of the OLIVER wheel tractor line. Your new SUPER "77" or SUPER "88" will make you a proud owner because it will give you unfaltering service and lasting satisfaction.

The SUPER "77" or SUPER "88" will meet all of your work requirements because of its exceptional adaptability. With its six forward and two reverse speeds, it has a speed for every job. It can be equipped with a direct drive power take-off which runs completely independently of your tractor progress. In addition, it has many other new features which make it a leader in its field.

Given the proper care which it deserves, your SUPER "77" or SUPER "88" tractor will serve you well by doing a quick, efficient job today and for many years to come.

THE OLIVER CORPORATION

MILITARY TRACTOR

INTRODUCTION

This Operator's Manual for Agricultural and Industrial Tractors covers the operation and maintenance procedure on the Row Crop, Standard and Industrial types 77 and 88 tractors equipped with either a gasoline or a Diesel engine. With the production of the military tractor, several changes were incorporated. In order to point out these changes to the operator, fly sheets have been added in the appropriate places throughout the manual giving the information on the military tractor that is either different from or not included in the manual for the regular tractor.

SAFETY RULES

1. ALWAYS SHUT OFF THE ENGINE BEFORE REFUELING.
2. BE SURE THE GEAR SHIFT LEVER IS IN NEUTRAL BEFORE STARTING ENGINE.
3. ALWAYS ENGAGE THE CLUTCH GENTLY, ESPECIALLY WHEN GOING UP HILL.
4. BE SURE THAT BOTH WHEELS ARE BRAKED SIMULTANEOUSLY WHEN MAKING AN EMERGENCY STOP.
5. NEVER RIDE ON THE DRAWBAR OF THE TRACTOR.
6. DO NOT PERMIT OTHER PERSONS TO RIDE ON THE DRAWBAR.
7. BE CAREFUL ON HILLS OR ROUGH GROUND TO AVOID OVERTURNING THE TRACTOR.
8. ALWAYS KEEP THE TRACTOR IN GEAR WHEN GOING DOWN HILL.
9. REDUCE SPEEDS BEFORE TURNING OR USING ONE WHEEL BRAKE.
10. ALWAYS DRIVE THE TRACTOR AT SPEEDS SLOW ENOUGH TO INSURE SAFETY.
11. ALWAYS STOP THE POWER TAKE-OFF BEFORE DISMOUNTING FROM THE TRACTOR.
12. NEVER DISMOUNT FROM THE TRACTOR WHILE IT IS IN MOTION.
13. NEVER STAND BETWEEN THE TRACTOR AND THE DRAWN IMPLEMENT WHEN HITCHING.
14. DO NOT PUT ON OR REMOVE THE BELT WHILE THE PULLEY IS IN MOTION.
15. DO NOT FILL THE RADIATOR WHEN THE ENGINE IS OVERHEATED.
16. BE SURE THE POWER TAKE-OFF SHIELDS ARE IN PLACE WHEN OPERATING A POWER IMPLEMENT.
17. NEVER OVERFILL THE DIESEL AIR CLEANER OIL CUP.
18. CHECK POSITION OF HYDRA-LECTRIC CONTROL LEVERS BEFORE STARTING ENGINE.
19. NEVER ENGAGE THE CLUTCH UNLESS IT IS POSSIBLE TO DISENGAGE IT IMMEDIATELY.
20. KEEP A FIRM GRIP ON THE STEERING WHEEL WHENEVER THE SPEED IS BEING INCREASED.
21. KEEP A FIRST AID KIT CLOSE AT HAND IN CASE OF EMERGENCY.
22. NEVER DRIVE A TRACTOR TOO CLOSE TO THE EDGE OF A DITCH OR GULLY.
23. NEVER WEAR LOOSE CLOTHING OR MITTENS WHEN WORKING AROUND THE BELT PULLEY OR POWER TAKE-OFF.
24. NEVER OPERATE THE ENGINE IN A CLOSED GARAGE OR SHED.
25. KEEP HANDS AWAY FROM ALL MOVING PARTS.
26. NEVER ATTEMPT TO MAKE ADJUSTMENTS WHILE THE TRACTOR IS IN MOTION.
27. NEVER USE A PITCH FORK NEAR A MOVING BELT.
28. DO NOT PERMIT CHILDREN TO PLAY NEAR MACHINE WHILE IT IS IN OPERATION.
29. SEE THAT THE TRACTOR IS PROPERLY GROUNDED WHEN DOING BELT WORK.
30. WHEN HITCHING A LOAD TO THE TRACTOR, ALWAYS HITCH TO THE DRAWBAR.
31. NEVER TAKE UP THE SLACK IN A CHAIN WITH A JERK.
32. BACK OUT OF DEEP GULLIES OR DITCHES TO PREVENT OVERTURNING TRACTOR.
33. NEVER OPERATE A TRACTOR ON A ROAD OR HIGHWAY AT NIGHT WITHOUT A WARNING LAMP.

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SAFETY IS YOUR CHEAPEST INSURANCE

MILITARY TRACTOR

TRACTOR

GENERAL

The Military tractor is a modification of the regular design. It has a standardized Military Engine and a 24-volt radio suppressed fungus treated electrical system.

SECTION I

TRACTOR

GENERAL

Oliver Super 77 and 88 Series tractors consist of several distinctly different models. These models are the Row Crop, Standard, Industrial, Ricefield and the Canefield tractor.

The Row Crop tractor features high clearance with adjustable rear wheel tread to meet all crop conditions. Also, this tractor is available with a dual or single wheel front end, or an adjustable front axle to suit your major crop requirements.

Standard Super 77 and 88 tractors are similar to the Row Crop models. They differ primarily in the front axle, front axle bolster and wheel equipment providing four wheel tread for added stability along with adequate height for crop clearance.

The Oliver Super 77 and 88 Industrial tractors have a four wheel tread and a low center of gravity for maximum stability on rough and hilly terrain. This rugged tractor differs from the Row Crop and Standard models primarily in the front frame, wheel equipment, rear axles, rear axle carriers, front bolster, front axle and engine clutch. The front axle is of sufficient length to provide clearance between the front wheels and radiator shell for front mounted equipment. The transmission is also designed to provide slower working speeds and faster road speeds.

The Ricefield tractor is a modification of the Super 88 Row Crop tractor. This model is equipped with splash panels, platform extensions and special ricefield rear tires.

The Canefield model is a Row Crop tractor with dropped axles in the rear and an extra high clearance in front raising the tractor about 30 inches above the ground for extra high crop clearance.

SERIAL NUMBERS

Tractors, engines, Hydra-Lectric and Hydraulic Control units are assigned serial numbers so that changes in design and material may be accurately recorded. Therefore, when requesting information or purchasing repairs for any of these units, always present the serial number of the unit to your Oliver Dealer.

The tractor specification and serial number are stamped on a metal plate attached to the rear panel assembly. (See Figure 1-1.) Always designate the tractor by the complete specification and serial number as they contain all the information necessary to select the correct repair items for your tractor.

The engine serial number is stamped on the side of the engine and is located in a vertical position along the crankcase flange immediately above the engine rear mounting bolt on the right-hand side of the tractor.

Each Hydra-Lectric and Hydraulic Control unit has the serial number stamped on a machined surface behind the gear shift lever socket on the right-hand side of the control mounting base.

It is advisable to record the above discussed serial numbers in your Operator's Manual so that they will be readily available at all times.

Figure 1-1 Tractor Specification and Serial Number Plate

Write the serial and specification numbers in the given spaces shown in Figure 1-1, just as they appear on the metal plate attached to the rear panel assembly. And, on the proper lines provided below, record the engine and Hydra-Lectric or Hydraulic Control unit serial numbers.

Engine Number _____

Hydraulic Unit Number _____

CHECKING THE TRACTOR

Your new Super 77 or 88 tractor was thoroughly checked at the factory and by your Oliver Dealer before it was delivered to you, but we suggest that you check the following in order to immediately become more familiar with the machine. Check the oil in the crankcase, transmission, power take-off, Hydra-Lectric or Hydraulic Control, steering gear housing or power steering unit and the air cleaner oil cup. Check the tires for the proper air pressure as outlined in the Specifications and inspect the radiator to see that it is filled with coolant.

WARNING

IF YOUR TRACTOR IS EQUIPPED WITH A HYDRA-LECTRIC OR HYDRAULIC CONTROL, DO NOT OPERATE THE TRACTOR UNTIL YOU HAVE READ THE INSTRUCTIONS ON THESE UNITS IN SECTION X.

BREAKING-IN A NEW TRACTOR

The break-in period for Oliver Super 77 and 88 tractors is 40 hours. During this initial 40 hours of operation, do not allow the tractor to work at full capacity. Run gasoline (HC) tractors at 1/2 to 3/4 full governed speed, and operate Diesel tractors at rated speed of 1600 revolutions per minute. To avoid overloading or lugging the engines, reduce the ground speed by using low range transmission gears. Keep the radiator filled with liquid and maintain the crankcase oil level within the *Working Range* on the bayonet gauge.

The tractor engine crankcase is filled at the factory with a special break-in oil. This oil must be drained after the first 20 hours of tractor operation. Refill the Super 88 tractor crankcase with six quarts and the Super 77 tractor crankcase with five quarts of high quality engine oil of the correct service classification as outlined in Section II.

After the first 150 hours of operation, have the tractor checked by your Oliver Serviceman. This inspection will assure you that the tractor is properly adjusted for continued economical performance.

SERVICE PERIODS

Throughout this manual service periods are outlined for servicing the component parts of the tractor. These periods of time intervals are based on normal operation.

Under dusty conditions the tractor should be lubricated more often. The air cleaner and the fuel filters should be serviced more frequently. If the tractor is being operated in conditions where dust completely engulfs the tractor at times, the service periods for these parts should be decreased to half the regular recommended time.

Under adverse operating conditions as described above, the engine oil should be changed more frequently.

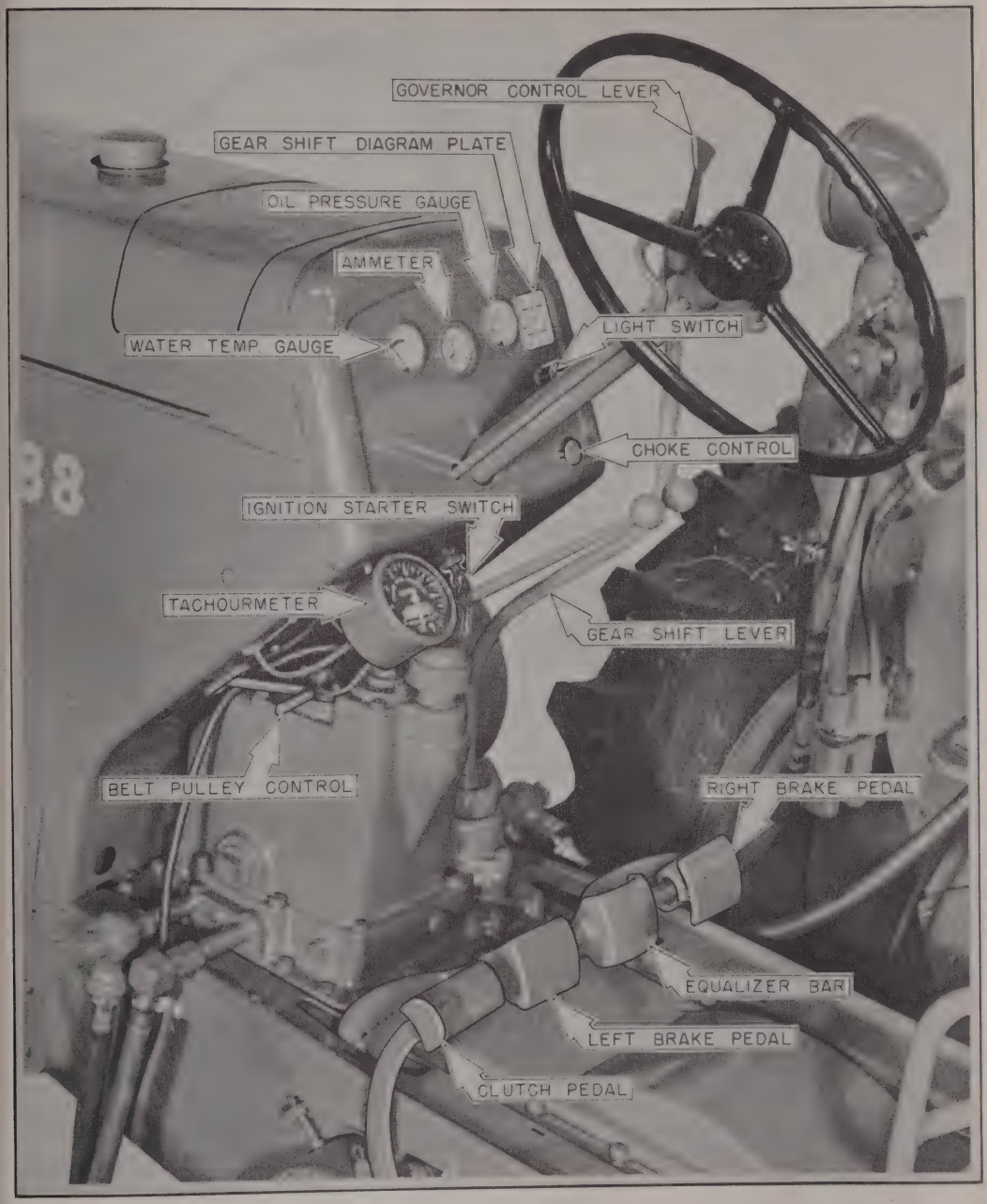


Figure 1-2 HC Controls

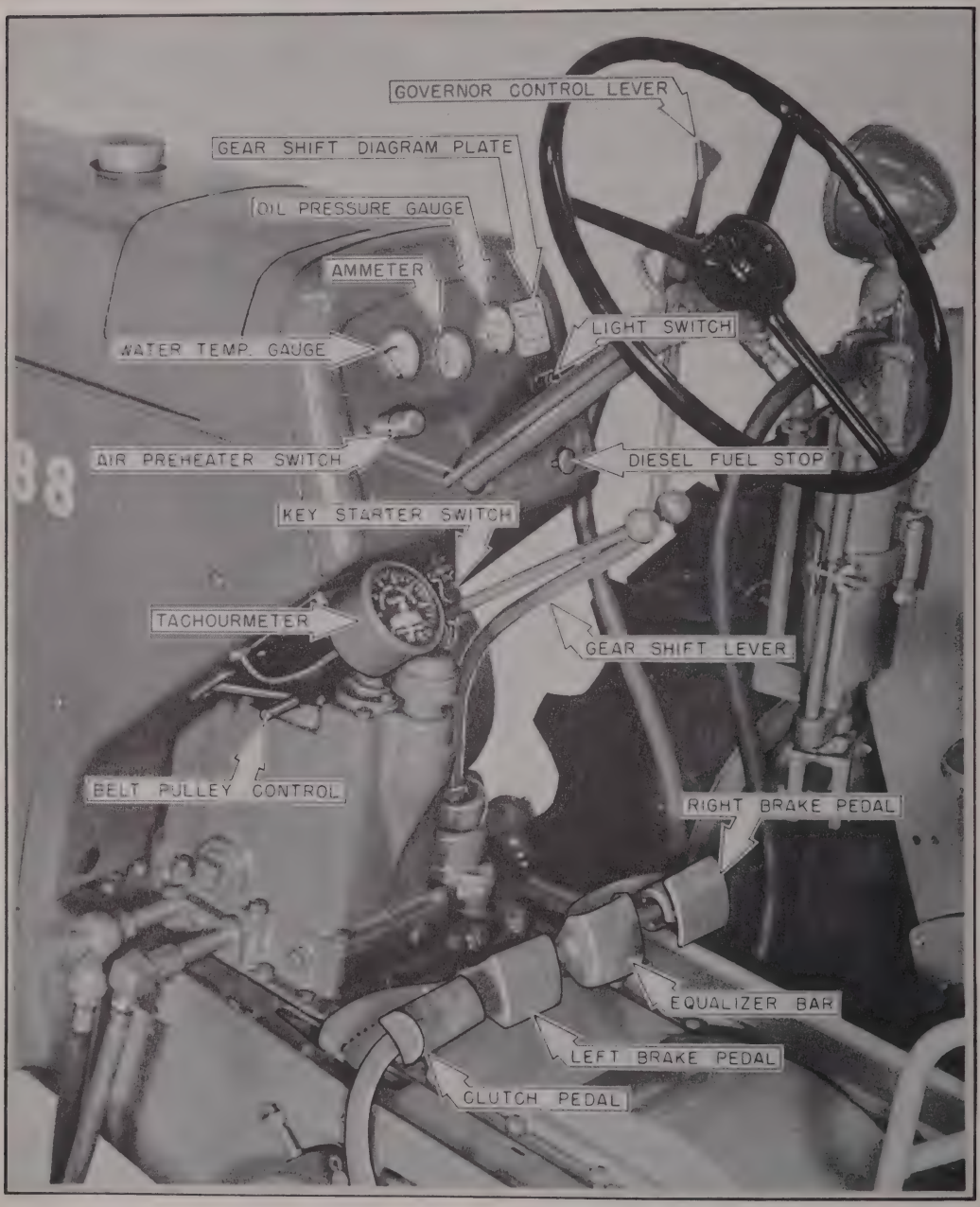


Figure 1-3 Diesel Controls

STARTING CRANK

A starting crank is furnished to be used when an external means to crank the engine is essential.

CONTROLS

IGNITION SWITCH

A lock-type ignition switch is located just below the instrument panel. To turn on the ignition switch, insert the key and turn it in a clockwise direction. To shut off the ignition, turn the key in a counterclockwise direction.

STARTER SWITCH

The starter switch is located in the upper left-hand corner of the instrument panel. It is a push button switch covered with a rubber boot to keep water and dirt from entering. Depressing this switch engages the starting motor with the flywheel ring gear and turns the engine for starting purposes. Releasing the switch opens the electrical circuit and allows the starting motor to become disengaged after the engine has started.

STARTING CRANK

Starting cranks are not furnished with the tractors. However provision has been made for their use. Starting cranks and the starting crank jaws are available from your dealer as repair items. The starting crank jaw may be installed in the front of the crankshaft by removing the 3/4 inch hex head cap screw and installing the jaw in its place.

When it is found necessary to turn the engine over for purposes other than starting the tractor engine such as for timing or making valve adjustments and a starting crank is not readily available, the engine may be turned with a socket wrench. Insert an 18-inch extension through the radiator grille. Install a 1-1/8-inch socket on the extension and insert it over the cap screw.

WARNING

DO NOT ATTEMPT TO START THE TRACTOR ENGINE WITH A WRENCH AS SEVERE INJURIES TO YOUR HAND AND ARM WILL RESULT.

CONTROLS

IGNITION STARTER AND HYDRA-LECTRIC SWITCH

Gasoline (HC) and Diesel tractors are equipped with a removable key, lock-type ignition starter switch just below the instrument panel. (See Figures 1-2 and 1-3.) This switch is provided as a safety feature to prevent possible damage to the tractor or injury from the use of the tractor by unauthorized personnel.

CAUTION

NEVER OPERATE THE STARTING MOTOR CONTINUOUSLY FOR MORE THAN 30 SECONDS.

Turning the key from the *Off* position to *Ignition On* completes the electrical circuit to the Hydra-Lectric Control unit and also to the ignition on HC tractors. (See Figure 1-4.) Continuing to turn the key switch will engage the starter. As soon as the engine starts, release the key and allow it to return to the *Ignition On* position. Be sure the key switch is turned off when the tractor is not in operation to protect the Hydra-Lectric and ignition systems.

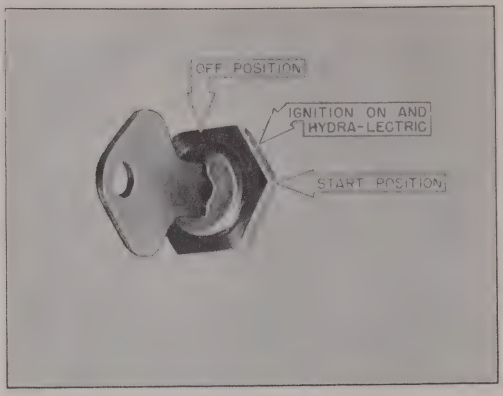


Figure 1-4 Ignition Starter Switch

NOTE

BE SURE TO TURN OFF THE IGNITION SWITCH BEFORE LEAVING THE TRACTOR.

GOVERNOR CONTROL

The speed of the tractor engine is changed by moving the governor control lever on the steering column. (See Figures 1-2 and 1-3.) When the control lever is at the top of the governor control quadrant, the engine runs at idle speed. As the control lever is moved downward, the engine speed is increased.

CHOKE CONTROL

The choke control for HC tractors is located on the lower right side of the instrument panel. (See Figure 1-2.) This control, which is connected to the butterfly choke valve in the carburetor, provides a means for enriching the fuel-air mixture when starting a cold gasoline engine.

LIGHT SWITCH

Your Oliver Super 77 or 88 tractor has a separate switch on the instrument panel for controlling the lights. (See Figures 1-2 and 1-3.) To turn on the two head lights and rear flood lamp, pull out the switch handle to the first notch or first *On* position. When it is desired to use the two head lamps and the rear tail lamp, pull out the handle to the second notch or second *On* position. The warning lamp socket under the tool box is connected in parallel with the two head lamps, therefore current is available in both *On* positions of the light switch.

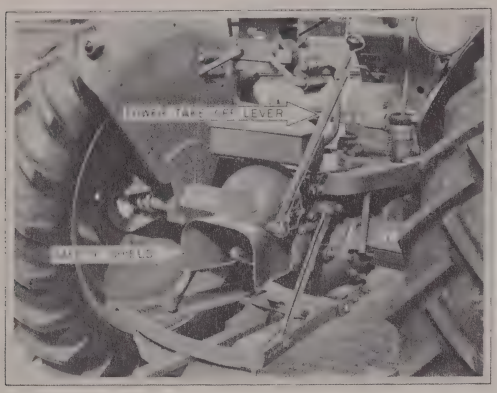


Figure 1-5 Power Take-Off

DIESEL FUEL STOP

The fuel stop control on the Diesel tractor is located on the lower right-hand side of the instrument panel. (See Figure 1-3.) Pulling out the Diesel fuel stop control shuts off the flow of fuel to the injection pump and stops the engine. This control must be pushed in before any attempt is made to start the tractor engine.

DIESEL AIR PREHEATER SWITCH

Combustion in the Diesel engine cylinders depends upon high temperatures and pressures. For cold weather starting, it is necessary to preheat the intake air to obtain the required temperatures for initial combustion. This is accomplished through the use of the heating coil attached to the engine intake manifold. This coil is operated by pushing in on the air preheater switch to the left of the steering column on the instrument panel. (See Figure 1-3.)

CLUTCH PEDAL

The clutch pedal is attached to the left side of the rear main frame. (See Figures 1-2 and 1-3.) Depressing this pedal with the left foot disengages the engine power from the transmission. This allows the belt pulley to be engaged or disengaged and the transmission gears to be shifted into the various travel speeds or into one of the neutral positions. Slowly releasing the clutch pedal re-engages the engine with the transmission.

BRAKE PEDALS

Right and left brake pedals connected by an equalizer bar are provided on the tractor for actuating the individual, disc type, differential steering brakes. (See Figures 1-2 and 1-3.)

The right and left brake pedals are to be used independently as an aid to turning and traction as slow tractor speeds only. For high speed operation, simultaneous and equal braking of the rear wheels may be obtained by pressing on the center of the equalizer bar. (See Figures 1-2 and 1-3.) It is imperative that this equalizer bar be used to brake the tractor at high speeds to avoid the possibility of overturning.

To hold the tractor in a stationary position on a hill or when performing belt or stationary power take-off work, lock latches are provided for each brake pedal. To lock the brakes, depress the pedals and engage the latches in one of the pedal serrations. To release the brakes and disengage the lock latches, push down on the pedals.

GEAR SHIFT LEVER

The gear shift lever is used to engage and disengage the different transmission gears of the tractor. Before shifting the transmission into any of the travel speeds, be sure you are familiar with the gear shift lever positions. A diagram plate showing these positions is attached to the instrument panel. (See Figures 1-2 and 1-3.)

BELT PULLEY CONTROL

The belt pulley is engaged and disengaged by a shifter rod on the left side of the rear panel assembly. (See Figures 1-2 and 1-3.) To engage the pulley, depress the clutch pedal and push the shifter rod in. Then slowly release the clutch pedal. To disengage the belt pulley, depress the clutch pedal and pull out on the shifter rod.

POWER TAKE-OFF CONTROL

The power take-off is controlled by a clutch lever to the right and to the rear of the tractor seat. (See Figure 1-5.) To engage the power take-off, press down on the clutch lever knob to release the lock and pull the lever slowly forward until it snaps overcenter. To disengage the power take-off, push the lever toward the rear of the tractor until it snaps overcenter and locks in the disengaged position.

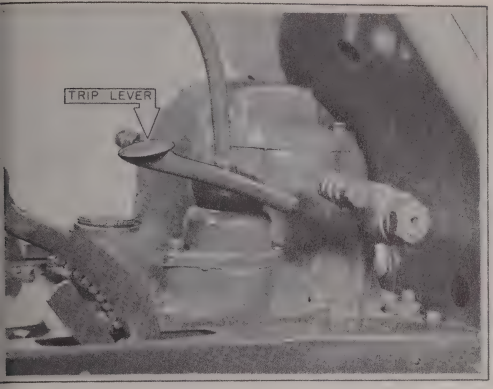


Figure 1-6 Mechanical Power Lift

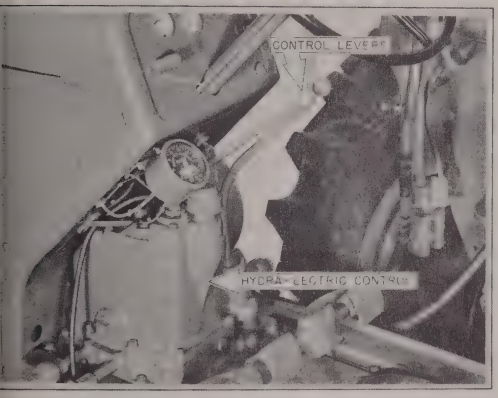


Figure 1-7 Hydra-Lectric Control

POWER LIFT CONTROL

The mechanical power lift, available as optional equipment, may be engaged by pressing down on the trip lever to the right of the gear shift lever .(See Figure 1-6.) When this trip lever is momentarily pressed with your foot, the power lift is engaged which raises or lowers the implement depending upon its position when the lift was actuated. Momentarily pressing again on the trip lever will engage the lift to complete the operation cycle. If the trip lever is held down with your foot, the power lift will continue to raise and lower the implement without stopping.

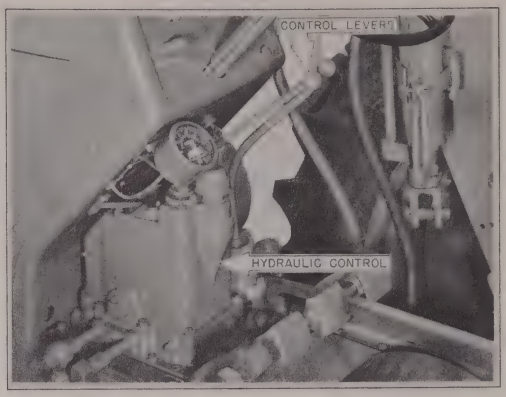


Figure 1-8 Hydraulic Control

HYDRA-LECTRIC CONTROL

Tractors equipped with the Hydra-Lectric Control will have one or two hand levers installed on the cover of the unit, depending upon whether the unit is equipped with one or two cylinders. (See Figure 1-7.) The hand levers each have four positions for operating the cylinders; *Up*, *Down*, *Visual Up* and *Visual Down*. The *Up* and *Down* positions of the levers are self-locking positions for raising and lowering implements. The *Visual Up* and *Visual Down* positions are self-return positions that are used for adjusting or changing the working depth of mounted and drawn equipment.

HYDRAULIC CONTROL

The Hydraulic Control, which is optional equipment for your Super 77 or 88 tractor, is similar to the Hydra-Lectric Control except it does not incorporate the automatic electrical system. (See Figure 1-8.) This Hydraulic Control is provided with a hand lever for operating each cylinder. These hand levers have two positions, *Up* and *Down*, for raising and lowering implements. Depth adjustments may be obtained visually by releasing the hand levers when the implement reaches the desired working position or by adjusting the depth control stop on the piston rod of the cylinder.

NOTE

OPERATION OF BOTH THE HYDRA-LECTRIC AND HYDRAULIC CONTROLS ARE DISCUSSED FULLY IN SECTION X.

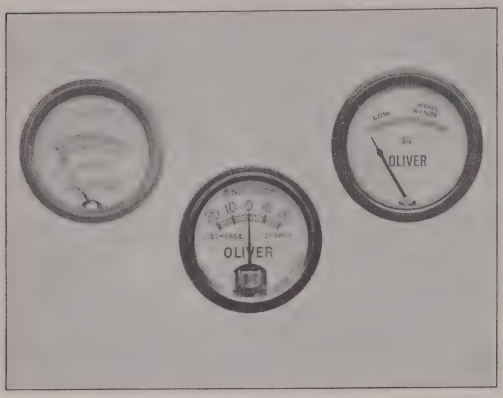


Figure 1-9 Gauges (Water, Ammeter, Oil)

Figure 1-10 Tachourmeter

INSTRUMENTS

OIL PRESSURE GAUGE

The oil gauge on the instrument panel indicates the pressure developed in the engine oiling system by the vane type oil pump. (See Figure 1-9.) The gauge dial is calibrated into a red *Low* range and a green *Work Range*. This gauge is the most important of all the instruments and the oil pressure must be maintained within the limits of the *Work Range* at all times except when the engine is operating at idle speed.

WATER TEMPERATURE GAUGE

The water temperature gauge on the instrument panel indicates the operating temperature of your tractor engine. (See Figure 1-9.) For your convenience, the gauge is marked in temperature ranges rather than actual temperature values. To obtain the most efficient operation and to prevent damaging the tractor engine, always maintain the operating temperature within the limits of the green *Work* range.

AMMETER

The ammeter on the instrument panel indicates whether the generator is operating and the amount of electrical current flowing to or from the battery or batteries. (See Figure 1-9.) Since the generator is equipped with an automatic current-voltage regulator, the ammeter reading will vary depending upon the state of charge of the battery or batteries and the electrical load connected into the system.

TACHOURMETER

The tachourmeter conveniently located below the instrument panel for easy reading provides a means for accurately noting at a glance the service record of the number of hours the tractor has been in operation and the engine speed in revolutions per minute. (See Figure 1-10.)

From the engine revolutions per minute readings it is possible to set the engine governor control lever to obtain the exact desired engine speed for operation of belt or power take-off driven machinery and for any desired travel speed. Refer to Specifications for calculating travel speeds.

The tachourmeter is calibrated to register one hour when the tractor engine is operating at average speeds. If the engine is operating for long periods at speed above or below the average speed, it will take a shorter or longer time to register one hour.

The tachourmeter drive is lubricated with oil from the engine crankcase. Should the unit be removed for any reason, the parts within should be given a coating of light grease to provide lubrication until engine oil is again pumped into the housing.

INSTRUMENTS

OIL PRESSURE GAUGE

The fungus treated oil pressure gauge shows the pressure developed by the oil pump. The oil pressure gauge is graduated from 0 to 60 pounds pressure and is electrically operated instead of pressure operated. The oil pressure gauge should register 35 pounds pressure when the engine is operating at a rated speed of 1600 revolutions per minute.

WATER TEMPERATURE GAUGE

The fungus treated water temperature gauge indicates the operating temperature of the tractor engine. This gauge is electrically operated and is graduated from 60 to 220 degrees Fahrenheit. Correct operating temperature of the Military tractor is between 175 and 195 degrees Fahrenheit.

AMMETER

The ammeter indicates whether the generator is operating and the amount of electrical current flowing in or from the batteries. This gauge is fungus treated and has a full scale deflection of 30 amperes. Since the tractor is equipped with an automatic current-voltage regulator, the ammeter reading will vary depending upon the state of charge of the batteries and the electrical load connected into the system.

HOUR METER

The counter type hour meter is located on the right side of the tractor directly below the distributor. The meter provides a means for accurately noting the service record of the number of hours the tractor has been in operation.

The counter type hour meter is calibrated to register one hour when the crawler engine is operating at rated engine speed. If the engine is operating for long periods at a speed above or below the rated engine speed, it will take a shorter or longer time to register one hour.

TOOL BOX AND TOOLS

The Military tractor is equipped with a conveniently located tool box secured to the seat mounting brackets. The tool box has a hinged lid and closing latch. To open the box release the latch and lift the lid.

A small set of tools is furnished to aid in making adjustments and minor repairs.

FIRE EXTINGUISHER

Attached to the right rear fender of the Military tractor is a fire extinguisher. It is a hand pump operated one quart capacity extinguisher.

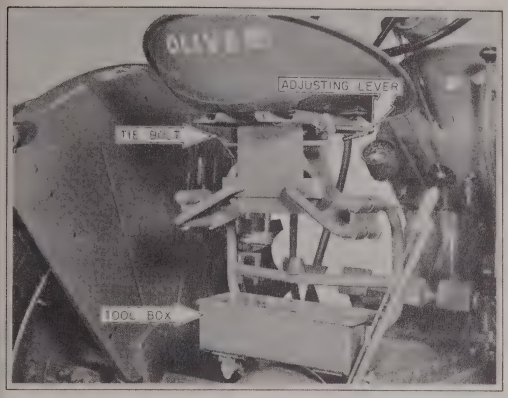


Figure 1-11 Tractor Seat and Tool Box

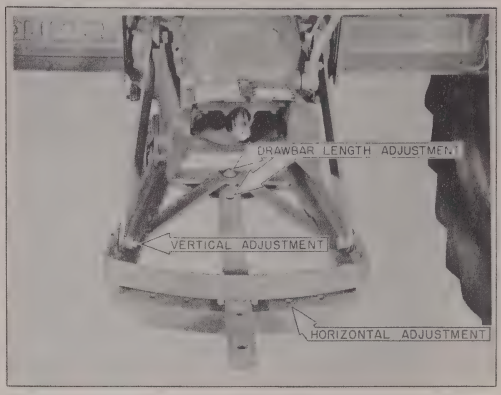


Figure 1-12 Drawbar Adjustments

TRACTOR SEAT

The Oliver Super 77 and 88 tractors are equipped with an adjustable, torsion spring, bucket type seat designed to provide greater riding comfort through long hours of tractor operation. (See Figure 1-11.)

The tractor seat is adjustable forward or backward and the tension on the rubber torsion springs may be adjusted to compensate for different field conditions and operators' weights. To adjust the seat, raise the adjusting lever and move the seat forward or backward as desired. There are eight notches in which the seat may be locked to provide a total horizontal adjustment of seven inches. The rubber torsion spring tension may be quickly and easily adjusted by turning the wing nut on the tie bolt under the left side of the seat pan. Turning this nut clockwise decreases the tension on the springs. To increase the spring tension, turn the nut in a counterclockwise direction.

TOOL BOX

Your Oliver Super 77 or 88 tractor is equipped with a conveniently located tool box secured to the seat mounting brackets. (See Figure 1-11.) The tool box cover is held in place by a spring at each end. To open the box, raise the cover and slide it back. The two springs will hold the cover removed until it is reinstalled.

DRAWBAR ASSEMBLY

The drawbar has a wide range of vertical and horizontal adjustments to facilitate hitching implements in the correct line of draft. (See Figure 1-12.) The vertical adjustments are obtained by bolting the drawbar adjusting links to the drawbar supports through one of the five holes provided. The horizontal adjustments are made by installing cap screws on each side of the drawbar through the holes provided. The drawbar may also be allowed to swing free through a range of 20-1/2 inches. In addition to the vertical and horizontal adjustments, the drawbar length may be changed. This is accomplished by attaching the drawbar to the tractor through one of the two holes in the front end of the drawbar, or by hitching the implement to the tractor through one of the two holes provided in the rear end of the drawbar.

When operating drawn type power take-off driven implements designed to SAE and ASAE Standards, the drawbar height should be adjusted so that it is 15 inches above the ground line. Also the drawbar should be attached to the tractor through its front hole and the implement should be attached to the drawbar through the rear hole.

EXTRA HIGH CLEARANCE DRAWBAR

The drawbar height of the extra high clearance tractor is adjustable from 15 to 21 inches above the ground on 88 tractors or 14 to 20 inches on 77 tractors. A series of 9 holes spaced every 3 inches provide a horizontal adjustment of 24 inches.

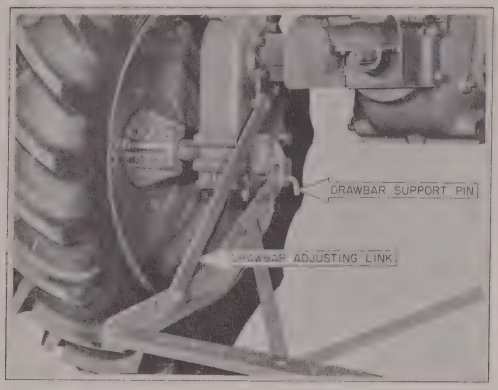


Figure 1-13 Extra High Clearance Drawbar Adjustment

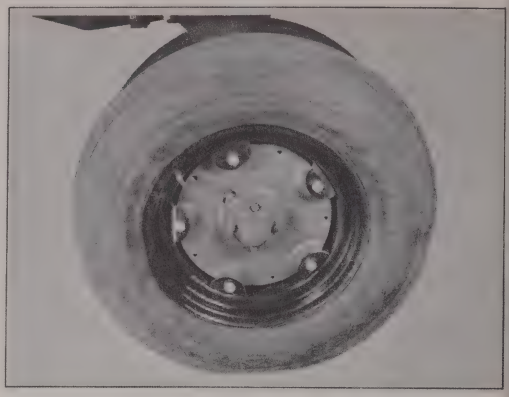


Figure 1-15 Rim Fastened To Raised Bosses

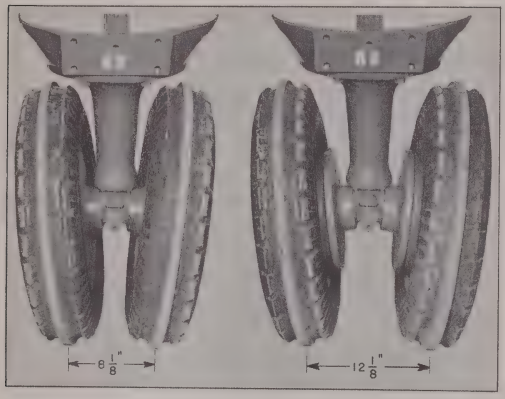


Figure 1-14 Dual Front Wheel Tread Adjustments

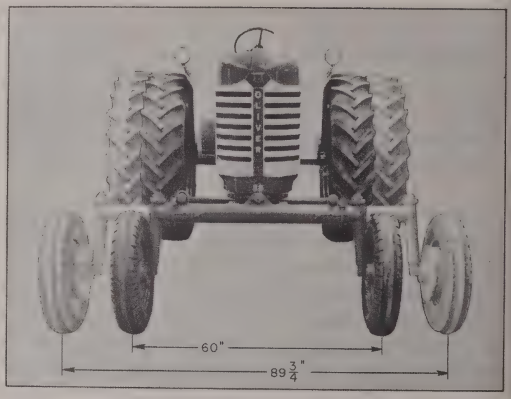


Figure 1-16 Adjustable Front Axle

When the drawbar is not required, it can be easily removed by removing the two support pins and the two 3/4-inch bolts in the top of the adjustment links. (See Figure 1-13.)

WHEEL TREAD ADJUSTMENTS

FRONT WHEELS

The front wheel tread setting may be changed on the Row Crop tractors. Cast iron front wheels permit four wheel-tread settings. On the dual front wheel tractors, these settings range from 8-1/8 to 12-1/8 inches. (See Figure 1-14.) Two of these four settings are obtained by first fastening the tire rims to the wheel proper and then to the raised bosses on the wheels. (See Figure 1-15.) Reversing the rims and repeating this installation procedure allows two more tread settings.

Two front wheel tread settings may be obtained with tractors equipped with stamped steel front wheels by installing the wheels on the hubs and then reversing the wheels.

In addition to the above front wheel tread settings, Row Crop adjustable front axle tractors may have the front wheel tread varied in two inch increments by extending the front axle and alternating the installation of the lock pin in the two holes provided in the front axle tube. (See Figure 1-16.)

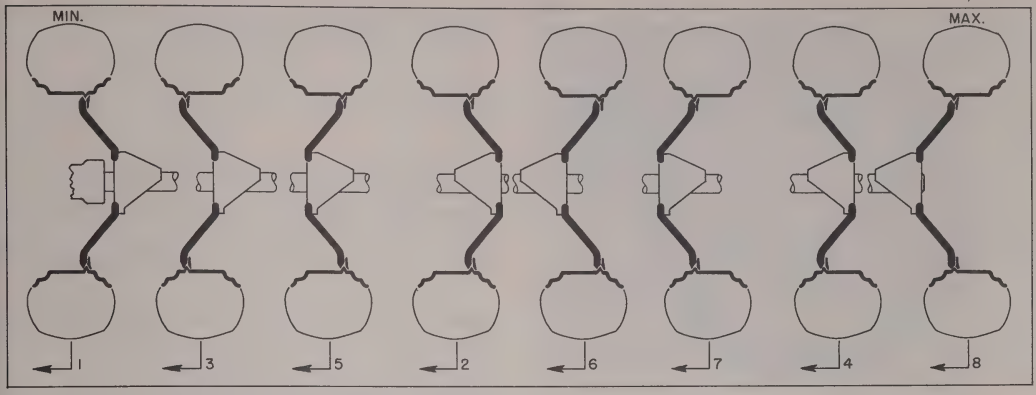


Figure 1-17 Cast Wheel, Rim And Hub Rear Tread Adjustments

REAR WHEELS

Rear wheel tread adjustments on Row Crop and Standard tractors equipped with cast steel wheels are made by reversing the rims on the wheels, reversing the wheels on the hubs, sliding the hubs on the axles and reversing the hubs on the axles. To obtain wheel tread settings less than 57-1/2 inches on the Super 77 tractor and 60 inches on the Super 88 tractor, the belt pulley must be removed. The wheel guards must also be removed or have spacers installed between them and the wheel guard mounting flanges on the axle carriers when these narrower rear wheel tread settings are used. (See Figure 1-17.)

Similar rear wheel tread adjustments are possible on Row Crop and Standard tractors equipped with the pressed steel rear wheels except the rims cannot be reversed on the wheel. (See Figure 1-18.)

The rear wheel tread setting on the Industrial tractor may be changed from 54 to 68 inches by reversing the inner rim support ring on the wheel. A rear tread setting of 87 inches may also be obtained by fastening the tire rim to an outer rim support ring, but this practice is not recommended unless the tractor is equipped with dual rear wheels.

Row Crop tractors may be equipped with special long axles where heavy rear mounted equipment require an extra wide rear wheel tread setting. These longer axles are available from your Oliver Dealer as special equipment.

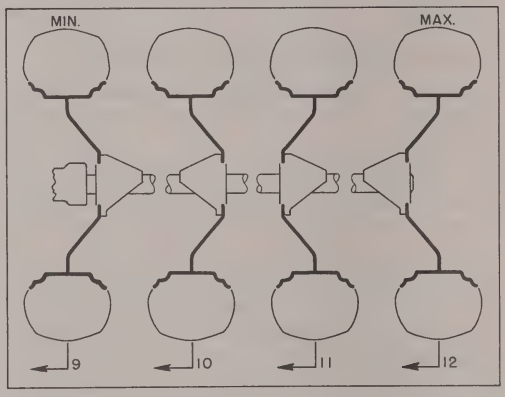


Figure 1-18 Steel Wheel And Rim Assembly Rear Tread Adjustments

A complete list of the front and rear wheel tread settings may be found in this section under Specifications. Where only one setting is given, it is not possible to change the wheel tread.

CAUTION

THOROUGHLY TIGHTEN THE U-BOLTS AFTER CHANGING THE HUB POSITION ON THE AXLE TO PREVENT REAR HUB BREAKAGE. THE REAR AXLE HUB U-BOLTS MUST BE KEPT AS TIGHT AS POSSIBLE, NOT LESS THAN 110 FOOT POUNDS TORQUE.

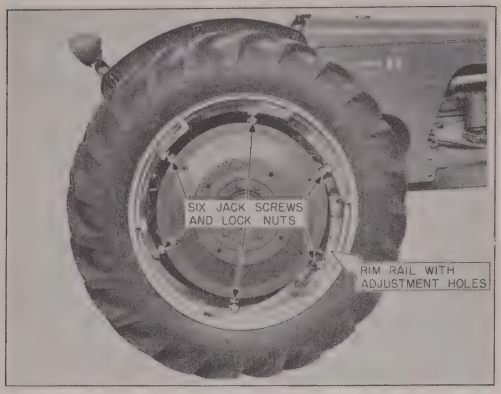


Figure 1-19 Power Adjusted Rear Wheels

POWER ADJUSTABLE REAR WHEELS

To adjust the power adjustable rear wheels, follow these steps for increasing the tread width from 48 to 68 inches.

1. Facing the tire loosen the innermost stop screw and move the stop body to the next desired adjustment hole setting. (See Figure 1-19.)

2. Loosen the two lock nuts on the jack screws nearest the top of the wheel until there is about 1/16 inch gap between the top jack screw and the rim rail.

3. Start the tractor and place it in low gear to increase the tread width of the left wheel, or in reverse to increase the tread width of the right wheel, and let the clutch out slowly until the wheel turns to the stop body.

4. Retighten the two jack screw nuts equally to be sure that the wheel is centered within the rim. A torque of 150 to 200 foot pounds should be applied to each nut.

5. Place the other stop body up to the closest position to the jack screw.

To increase the wheel tread to 76 inches, the wheel disc must be positioned so that it is facing outward. Then repeat the above steps. To decrease the tread width, reverse the above direction of rotation of the wheels.

After four hours of operation, recheck the jack screws as they must be kept tight at all times.

ENGINE STARTING PROCEDURE

Before starting the tractor engine, be sure the radiator is filled with coolant and the crankcase oil level is within the *Working Range* on the bayonet gauge.

When starting an engine, never keep the starting motor continuously engaged for more than 30 seconds. If the engine does not start within this allotted time, release the starter switch and allow one or two minutes for the motor to cool before again attempting to start the engine.

STARTING HC ENGINES

If the weather is cold, pull out the choke control. The amount of choking necessary to start an engine is determined primarily by atmospheric temperatures. Practice and experience will teach you the exact amount of choking required to start the tractor engine under all conditions. Place the transmission shifter lever in a neutral position, and move the governor control lever to the center of the governor control quadrant. Depress the clutch pedal, disengage the power take-off clutch and turn on the ignition starter switch to the extreme right to engage the starter motor. When the engine starts, release the starter switch, check the oil pressure gauge, adjust the choke control so that the engine runs smoothly, reset the governor control lever to approximately the 1/4 open throttle position and gradually release the clutch pedal. Operate the tractor engine at approximately 1/4 open throttle until it warms up to operating temperature before placing it under load. Push in the choke control.

STARTING DIESEL ENGINES

Diesel engines are equipped with an electrically operated, manually controlled air preheater attached to the engine intake manifold. (See Figure 1-20.) This preheater is provided for cold weather starting to raise the temperature of the air in the intake manifold before it is drawn into the combustion chambers.

STARTING HC ENGINES

The starting procedure for a Military HC tractor is identical to the regular Allis-Chalmers HC tractor with one exception. The Military tractor has separate ignition and starter switches to turn on the ignition and engage the starting motor.

To check the operation of the air preheater, press in on the preheater switch for approximately 30 seconds. Then place your hand on the base of the preheater. If the preheater is cold, the element may be burned out or there may be a loose or broken cable in the electrical circuit.

The procedure for starting the Diesel engine varies with the temperature of the atmosphere. However, certain steps are similar regardless of the condition of the weather. Place the governor control lever in the center of the governor control quadrant, depress the engine clutch pedal, disengage the power take-off clutch and push in the Diesel fuel stop control. For temperatures below freezing, energize the heating coil in the air preheater for 10 to 20 seconds by pressing on the preheater switch. If the temperature is near zero degrees Fahrenheit, the preheater must be operated for the full 20 seconds. As soon as the preheater switch is released, turn the engine with the starting motor one or two revolutions to draw the warm air from the intake manifold into the engine cylinders. Repeat this heating cycle three or four times, again depending upon the air temperature, until the chill is removed from the intake manifold and engine cylinders. Then engage the starting motor by turning the switch key to the extreme right and start the engine. If the engine does not start within 15 seconds, repeat the heating cycles.

CAUTION

NEVER OPERATE THE AIR PREHEATER AND THE STARTING MOTOR AT THE SAME TIME.

After the engine starts, release the switch key, check the oil pressure gauge, slowly release the clutch pedal and set the governor control lever to the 3/4 full governed speed position. Then allow the Diesel engine to warm up before placing it under load.

When starting the Diesel engine, hold the starting switch on until the engine starts and fires several times, or until it has definitely been determined that the engine will not start, before releasing the switch.

If the starting motor is disengaged at the same moment the engine fires, the engine may start running backward as outlined under Tractor Operation.

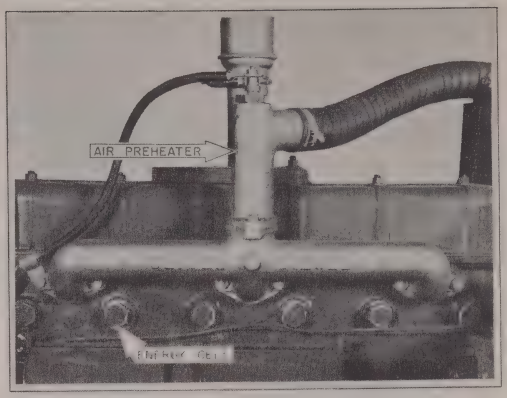


Figure 1-20 Diesel Air Preheater

CAUTION

ALWAYS DISENGAGE POWER TAKE-OFF BEFORE STARTING THE TRACTOR ENGINE.

TRACTOR ENGINE OPERATION

The life of the tractor engine will be considerably lengthened if it is allowed to warm up before it is put under load. Placing a cold engine under load results in poor engine lubrication, corrosion, acid formation, crankcase dilution, reduced power and poor fuel economy.

At no time should you attempt to pull loads that are beyond the engine's power. If the engine begins to lose speed under a heavy load, shift the transmission into a lower gear and allow the engine to operate at governed speed.

For the best economy of operation while performing drawbar work with an HC engine, use the highest transmission speed at the lowest engine speed that will satisfactorily pull the load. Operating an Oliver gasoline engine at full governed speed maybe necessary under some load conditions, such as belt pulley or power take-off work, but highest engine efficiency is obtained when operating between 1/2 to 3/4 full governed speed.

For best performance, highest engine efficiency and long life, Diesel tractors should be operated at full governed speed when it is under load. Ideal operating conditions are attained when the Diesel engine is pulling its rated load at full governed speed of 1600 revolutions per minute. However, since these optimum conditions are seldom encountered in actual tractor applications, it is recommended that the Diesel tractor be operated at full governed speed at all times whether it is operating under a light or a heavy load. Prolonged idling or excessive operation under load at slow engine speeds should definitely be avoided if it is at all possible.

Disengaging the engine clutch on a Diesel tractor that is about to stall under a heavy load may cause it to start running backward. If this occurs, air is drawn into the engine through the exhaust manifold and the exhaust is expelled through the intake manifold and air cleaner assembly. After a Diesel engine has run backward, it is necessary to remove and clean the air cleaner and to replace the oil in the air cleaner cup.

STOPPING THE TRACTOR ENGINE

Tractor engines that have become overheated as the result of heavy work must be cooled before stopping. Reduce the temperature to normal by running the engine at moderate speed for a few minutes to circulate the liquid in the cooling system and carry away the residual heat. Warped valves and valve seats are a common result of stopping a hot engine.

Run the HC engine at about 1000 revolutions per minute for a few minutes to clear the cylinders of excess fuel. Place the governor control lever at the top of the governor control quadrant, and when the engine returns to idle speed, turn the ignition switch to the *Off* position.

Before stopping a Diesel engine, allow it to run at a fast idle speed for a few minutes until the temperature has decreased to the lower part of the *Work* range on the temperature gauge. Pull the fuel stop control out and hold it in this position until the engine stops. If the engine does not stop when this control is pulled out, it may be stopped by stalling, To stall the engine, apply the brakes, place the gear shift lever in the highest forward transmission speed and slowly engage the engine clutch. If the fuel stop control fails to stop the engine when it is pulled out, check and repair the fuel stop wire connections after stalling the engine.

SEASONAL PREPARATION

Seasonal preparation should be carried out every spring and fall to prepare the tractor for the temperature conditions to be encountered during the coming seasons.

1. Drain and flush the cooling system. Install new radiator hoses in the fall before filling the system with a pernament type anti-freeze solution of sufficient strength to withstand the lowest temperature anticipated.

2. Clean and regap the spark plugs. Set the gap at .025 inch.

3. Check all electrical wiring. Check the distributor and set the point opening to .022 inch.

4. Adjust the valve clearance.

5. Set the ignition timing as outlined in Section IV.

6. Check and recharge the battery or batteries.

7. Drain, flush and refill the tractor fuel tank.

8. Adjust the carburetor as outlined in Section III.

9. Adjust the governor as outlined in Section III.

10. Remove the front wheels and wash out the old grease with a cleaning solvent. Repack them with a No. 1 grade multi-purpose lithium or calcium base grease.

11. Drain, flush and refill the transmission and differential.

12. Lubricate the entire tractor as outlined in the Lubrication Charts.

13. Tighten all accessible nuts, bolts and cap screws.

14. Drain and refill the engine crankcase. If the tractor has been operated through the winter months, remove and clean the oil pan before refilling.

15. Check and stop all oil, fuel and water leaks.

16. If tractor is equipped with a hydraulic system, drain and refill with recommended oil each spring.

17. If the tractor is equipped with a coolant heater, it should be removed and cleaned to assure top performance.

COLD WEATHER OPERATION

There are a few precautions that must be taken to keep the tractor in the proper operating condition during cold weather. The following list will serve as a guide in maintaining high tractor efficiency.

1. Keep the battery or batteries fully charged. Batteries in a completely charged condition will not freeze under the normal winter temperatures encountered in the temperate zone.

2. Warm up the engine as quickly as possible after starting. Cover the radiator, if necessary.

3. Periodically loosen or remove the crankcase oil pan drain plug to determine if any water or ice has accumulated. If water or ice is present, run the engine until it is thoroughly warmed up. Then drain the crankcase and refill with new seasonal grade engine oil.

4. Fill the fuel tank each evening after stopping the tractor. Filling the tank in the evening forces out the air and prevents condensation. On Diesel tractors, drain the water trap under the tank before filling with Diesel fuel.

5. Grease the tractor at the end of each day's operation.

6. Clean the mud and snow accumulations from the tractor.

7. If possible store the tractor in a warm shed when it is not in use.

8. Frequently empty and clean the fuel strainer assemblies.

9. Check the cooling system anti-freeze periodically.

10. If liquid weight is used in the tires, be sure sufficient anti-freeze has been added to protect the solution against freezing.

11. For winter operation or in temperatures below 32 degrees Fahrenheit, change HC engine oil oil every 60 hours and Diesel engine oil every 40 hours of tractor operation.

PREPARATION FOR STORAGE

HC TRACTORS

1. Drain and flush the transmission. Refill with the seasonal grade of oil to be used when the tractor is again placed in operation. Operate the tractor for a short time to circulate the oil through the gears.

2. Drain the crankcase. Remove, clean and reinstall the oil pan. Fill the crankcase with a preservative oil or with an engine oil to which an inhibiter has been added.

3. Remove the air cleaner to carburetor hose. Start the engine and inject preservative oil into the carburetor air intake with a manually operated sprayer or squirt can while the engine is operating at idle speed. Stop the engine by increasing the quantity of oil sprayed into the air intake and reinstall the hose.

4. Drain and flush the cooling system. Check the condition of the radiator hoses. Replace all hoses that are soft or leaky before filling the system with soft water to which 1/2 pint of soluble oil or other commercial rust inhibiter has been added. If the tractor is to be stored through the winter, fill the system with an anti-freeze solution. Always keep the cooling system filled during storage to prevent excessive rust formation.

5. Remove the cylinder head cover, and pour 1/2 pint of preservative oil over the rocker arm and valve mechanism. Reinstall the cylinder head cover.

6. Remove the spark plugs from the engine. Pour 1/8 pint of preservative oil into each combustion chamber. Turn the engine a few revolutions by hand to distribute the oil over the pistons and cylinder walls. Coat the spark plug threads with oil before reinstalling them in the engine.

7. Drain the fuel from the fuel tank, fuel lines and carburetor.

8. Remove the distributor cap, and apply a small amount of petroleum jelly to the polished surface of the breaker cam. Where dampness in storage is expected, removal of the distributor is recommended.

9. Cover the air cleaner intake pipe, exhaust outlet, crankcase breather opening and the opening left by the removal of the distributor. Wax type masking tape is a suitable material for covering these openings to prevent the entrance of dirt and mosture.

10. Install a new oil filtering element.

11. Remove, clean and refill the air cleaner oil cup.

12. Remove, wash, clean and repack the front wheel hubs.

13. Relieve the tension on the fan and generator belt.

14. Grease the entire tractor as outlined in the Lubrication Charts.

15. Clean the tractor to remove all dirt and grease. Remove rust spots and paint all areas where paint is missing.

16. Remove and clean the battery. Charge the battery and store it in a cool, dry place. Check and recharge the battery every four or five weeks.

17. Block or wire the clutch pedal down so that the clutch facings will not stick to the flywheel or clutch pressure plate.

18. Wipe all oil and calcium chloride from the exterior of the tires.

19. Place the tractor on blocks so that the tires are free of the floor and deflate them several pounds below normal. Tires containing fluid need only the weight of the tractor removed, allowing them to support their own weight on the floor.

20. Tractors stored outside should be covered with a large tarpaulin.

WARNING

NEVER ALLOW THE TRACTOR TO STAND IDLE OVER THIRTY DAYS UNLESS IT IS PREPARED FOR STORAGE.

DIESEL TRACTORS

Diesel tractors may be prepared for storage in nearly the same manner as outlined for HC tractors. The fuel system, however, is much more subject to damage and must be given special attention.

To protect the fuel system, valves and cylinder walls, flushing oil must be used instead of Diesel fuel. Pour one or two gallons of flushing oil into the fuel tank and run the engine until the exhaust smoke turns to a blue-white color. Continue running the engine for an additional ten minutes. Then proceed to prepare the tractor for storage as outlined for HC tractors, with the exception of those steps pertaining to the fuel and ignition systems.

If a commercial Diesel flushing oil is not available, a mixture of one part water-white kerosene to one part SAE 10W engine oil may be used as a fuel.

Once each month while the tractor is in storage, remove all covers, install the batteries and turn the engine by hand to make sure the pistons are free in the cylinders. Start the engine and allow it to run for approximately ten minutes, using the flushing oil as a fuel. Stop the engine, install the covers, and remove and recharge the batteries.

PREPARATION FOR OPERATION AFTER STORAGE

After the tractor has been in storage, it is necessary to perform certain service operations to return the tractor to the proper operating condition. The following recommendations will aid in immediately obtaining maximum efficiency from the tractor after it has been in storage.

1. Grease the entire tractor as outlined in the Lubrication Charts.
2. Inflate the tires to the recommended pressure, and remove the tractor from the blocks.
3. Remove the block or wire from the clutch pedal.
4. Remove all special covers that were installed.
5. Fill the cooling system with the proper seasonal coolant.
6. Examine the cooling system and repair all leaks.
7. Adjust the fan belt.
8. Remove, clean and adjust the spark plugs on HC tractors. Pour 1/8 pint of light engine oil into each combustion chamber.
9. Remove, clean and dry the crankcase breather. Oil the metal wool in the breather with a few drops of engine oil.
10. Remove the cylinder head cover and pour 1/2 pint of very light oil over the rocker arm and valve assembly.
11. Check and install the battery or batteries.
12. Turn the engine slowly to ensure that all working parts are free to move.
13. Adjust the valve clearance as outlined in Section II.
14. Install the cylinder head cover, breather and spark plugs.
15. Install the distributor and adjust the breaker point opening to .022 inch on HC tractors.
16. Check the electrical wiring. Clean and tighten all connections and replace all damaged wires.
17. Remove and clean the fuel strainer assemblies.
18. Fill the fuel tank. Remove all flushing oil from the Diesel fuel tank and refill with clean Diesel fuel.
19. Drain the preservative oil from the crankcase and refill with new seasonal grade engine oil.
20. Start the engine and run it at idle speed. Do not increase the engine speed until you are sure it is operating correctly.
21. Check the operation of the Hydra-Lectric or Hydraulic Control as outlined in Section X. Also check the power take-off and belt pulley.
22. Check the ammeter for correct generator operation.
23. Check the fuel lines for leaks.
24. Adjust the carburetor on HC tractors as outlined in Section III.
25. Check and set the ignition timing on HC tractors as outlined in Section IV.
26. Adjust the brakes, if necessary.

KEEP HANDS AWAY FROM ALL MOVING PARTS

SPECIFICATIONS

	SUPER 77	SUPER 88
TRACTOR		
Crop or Ground Clearance		
Row Crop	25-1/8"	25-3/4"
Standard	18-1/2"	18-1/2"
Industrial	11-1/8"	11-7/16"
Extra High Clearance	30-13/16"	31-5/8"
Height Overall		
Row Crop	89-1/4"	90-7/8"
Standard	90-1/8"	91-3/4"
Industrial	86-9/16"	86-11/16"
Extra High Clearance	99-7/8"	102-15/16"
Width Overall		
Row Crop	80-1/4"	80-1/4"
Standard	80-1/4"	80-1/4"
Industrial		
Single Rear Wheels	64-3/8"	67-1/2"
Dual Rear Wheels	97-3/8"	100-1/2"
Length Overall		
Row Crop		
Dual Front Wheels	139-1/4"	143-9/16"
Adjustable Front Axle	145-25/32"	151-1/8"
Standard	140-3/4"	145"
Industrial	133-15/16"	135-11/16"
Wheel Base		
Row Crop		
Dual Front Wheels	90-23/32"	93-11/16"
Adjustable Front Axle	97-1/4"	100-1/4"
Standard	90-15/16"	93-7/8"
Industrial	81-3/4"	82-13/16"
DRAWBAR ASSEMBLY		
Horizontal Adjustment		
Row Crop	20-1/2"	20-1/2"
Standard	20-1/2"	20-1/2"
Industrial	20-1/2"	20-1/2"
Extra High Clearance	24"	24"
Vertical Adjustment		
Row Crop	11-3/16 to 20-1/4"	9-13/16 to 18"
Standard	12-3/16 to 21-1/4"	10-3/16 to 19"
Industrial	9-3/16 to 17-5/16"	10-3/4 to 18"
Extra High Clearance	14 to 20"	15 to 21"
APPROXIMATE BASIC SHIPPING WEIGHT		
Row Crop	3750 lb.	4700 lb.
Standard	3950 lb.	4900 lb.
Industrial	4625 lb.	5280 lb.
Extra High Clearance	4800 lb.	5775 lb.

MILITARY TRACTOR

SPECIFICATIONS

APPROXIMATE BASIC SHIPPING WEIGHT

Military Industrial	4850 lb.

ENGINE

Make	Waukesha
Type	Gasoline
Number of Cylinders	6
Firing Order	1-5-3-6-2-4
Bore	3-7/16"
Stroke	3-3/4"
Piston Displacement	209 Cu. In.
Compression Ratio	6.25 : 1
Engine Operating Temperature	170 to 195° F.
Engine Speed (RPM)	
Idle Speed	350
Rated Speed	1600
High No Load Speed	1750
Crankcase Oil Change Period	60 hours
Oil Filter Element Change Period	300 hours
(Use Military Standard Service Element or Fleetguard 671-1/300)	
Valve Clearance Adjustment	
Intake (Cold)	.009 to .010"
Exhaust (Cold)	.015 to .017"

WHEEL TREAD ADJUSTMENT	SUPER 77	SUPER 88
Front		
Row Crop		
Dual Front Wheels		
Cast Iron	8-1/8 to 12-1/8"	8-1/8 to 12-1/8"
Pressed Steel	7-11/16 and 12-13/16"	7-11/16 and 12-13/16"
Adjustable Front Axle	60 to 89-3/4"	60 to 89-3/4"
Standard	62"	62"
Industrial		
Regular Axle	55-1/2"	55-1/2"
Optional Axle	67-1/2"	67-1/2"
Extra High Clearance	69 to 77"	69 to 77"
Rear		
Row Crop		
Regular Axle	46 to 92-1/2"	46 to 92-1/2"
Special 60 to 90 Inch Axle	46 to 110-1/2"	
Special 100 Inch Axle	57-3/4 to 121-7/16"	57-3/4 to 121-7/16"
Standard	60-5/8 to 92-1/2"	63-5/8 to 92-1/2"
Industrial	52-1/2 to 85-1/2"	54 to 87"
Extra High Clearance	64 to 96-1/2"	64 to 96-1/2"

ENGINE	SUPER 77		SUPER 88	
	HC	Diesel	HC	Diesel
Number Of Cylinders	6	6	6	6
Firing Order	1-5-3-6-2-4	1-5-3-6-2-4	1-5-3-6-2-4	1-5-3-6-2-4
Bore	3-1/2"	3-1/2"	3-3/4"	3-3/4"
Stroke	3-3/4"	3-3/4"	4"	4"
Piston Displacement	216 cu. in.	216 cu. in.	265 cu. in.	265 cu. in.
Compression Ratio	7.3:1	15.5:1	7.3:1	15.5:1
Engine Speed (RPM)				
Idle Speed	350 — 400	650 — 700	350 — 400	650 — 700
Rated Speed	1600	1600	1600	1600
High No-Load	1750	1750	1750	1750
Timing Mark				
Flywheel Timing Mark - TDC	0^{o}	0^{o}	0^{o}	0^{o}
Total Advance - BTDC	22^{o}	23^{o}	22^{o}	23^{o}
Engine Operating Temperature	155 to 200° F.	155 to 212° F.	155 to 200° F.	155 to 212° F.
Crankcase Oil Change Period	90 hours	60 hours	90 hours	60 hours
Oil Filter Change Period	Every fourth oil change		Every fourth oil change	
Use HC Filter No. 100 126-A	X		X	
Use Diesel Filter No. 100 125-A		X		X
Fuel Filter Change Period				
Primary (Part No. 1LA-5351)		750 hours		750 hours
Secondary (Part No. 90910)		2000 hours		2000 hours
Valve Clearance Adjustment (Cold)				
Intake	.009 to .011"	.009 to .011"	.009 to .011"	.009 to .011"
Exhaust	.015 to .017"	.019 to .021"	.015 to .017"	.019 to .021"

POWER STEERING (SUPER 77 AND 88)	
Operating Pressure	950 — 1100 pounds per square inch
Pump	Direct driven from generator
Cylinder	Integral with steering gear
Lubrication	SAE 10W engine oil

	SUPER 77	SUPER 88
MINIMUM TURNING RADIUS		
Row Crop		
Dual Front Wheels	9-1/4'	9-3/4'
Adjustable Front Axle	14-1/4'	14-3/4'
Standard	12-1/2'	12-1/2'
Industrial	12-1/2'	12-1/2'
UNIT CAPACITIES		
Cooling System	4-1/2 gal.	4-1/2 gal.
Fuel Tank		
HC	16.79 gal.	20.30 gal.
Diesel	16.87 gal.	18.20 gal.
Crankcase	5 qt.	6 qt.
Transmission	4-1/2 gal.	4-1/2 gal.
Air Cleaner Oil Cup		
HC	1 pt.	1 qt.
Diesel	1-5/8 pt.	1 qt.
Front Wheels	1/2 pt.	1/2 pt.
Steering Gear Housing		
Row Crop		
Dual Front Wheel	1/2 pt.	1/2 pt.
Adjustable Front Axle	1 pt.	1 pt.
Single Front Wheel	3/4 pt.	3/4 pt.
Standard	1 pt.	1 pt.
Industrial	1 pt.	1 pt.
Power Steering Unit	1 qt.	1 qt.
Power Take-Off	1 pt.	1 pt.
Hydra-Lectric and Hydraulic Control		
Two 3-Inch Cylinder Unit For Mounted Implements	9-1/2 qt.	9-1/2 qt.
Two 4-Inch Cylinder Unit For Mounted Implements	11 qt.	11 qt.
Two 3-Inch Cylinder Unit For Mounted and Drawn Implements	10 qt.	10 qt.
Two 4-Inch Cylinder Unit For Mounted and Drawn Implements	11-1/2 qt.	11-1/2 qt.
One 3-Inch Cylinder Unit For Drawn Implements	9-1/4 qt.	9-1/4 qt.
One 4-Inch Cylinder Unit For Drawn Implements	10 qt.	10 qt.
Fluid Reserve In Reservoir		
Two Cylinder Unit	5-3/4 qt.	5-3/4 qt.
One Cylinder Unit	6-1/2 qt.	6-1/2 qt.

TRANSMISSION LUBRICATION (SUPER 77 AND 88)	
Above 32° F.	SAE 140
Below 32° F.	SAE 90

ENGINE LUBRICATION (SUPER 77 AND 88)	
Above 32° F.	SAE 20, 20W or 10W-30
Between +10° F. and 32° F.	SAE 10W or 5W-20
Below +10° F.	SAE 5W or 5W-20

MILITARY LUBRICATION SPECIFICATIONS

Engine Oil H.C.	MIL-2104 A	SAE 10 & 30
Transmission Oil	MIL-2105	Lubricant Gear Universal
Pressure Gun Grease	MIL-G-10924	Grease Automotive and Artillery

IGNITION AND ELECTRICAL SYSTEM

Type	Battery, 24-volt negative ground
Spark Plugs	
Size	18 mm (7/8" hex)
Electrode Gap	.025"
Distributor	
Rotation	[illegible]
Lubrication	SAE 10W and 20W engine oil
Point Gap	.022"
Fuses	20 ampere
Lights	
Head and Flood	
Type	Flange
Size	40 candle power
Capacity	24-28 volt
Tail	
Type	Bayonet
Size	6 candle power
Capacity	24-28 volt

Battery - Ordnance Part Number #572553

Number of Batteries	Two 12-volt connected in series
Capacity	90 ampere hours
Size (SAE)	2MM
Location	Under hood

POWER TAKE-OFF (SUPER 77 AND 88)

Operation	Independently controlled
Speed At 1600 RPM Rated Engine Speed	533 revolutions per minute
Rotation	Clockwise
Shaft Size	1-3/8"
Length Of Spline	3"
Lubrication	Separate reservoir - Seasonal grade transmission oil

IGNITION AND ELECTRICAL SYSTEM (SUPER 77 AND 88)

Type	Battery, 12-Volt, positive ground
Spark Plugs	
Size	18 mm (7/8" hex.)
Electrode Gap	.025"
Distributor	
Rotation	Clockwise
Lubrication	SAE 10W and 20W engine oil
Point Gap	.022"
Fuses	20 ampere
Lights	
Head and Flood	
Type	Sealed beam
Size	32 candle power
Capacity	12-16 volt.
Tail	
Type	Bayonet
Size	3 candle power
Capacity	12-16 volt

	HC	DIESEL
Battery		
Number	One 12-volt	Two 6-volt connected in series
Capacity	70 ampere hours	130 ampere hours
Size (SAE)	3KM	2H
Location	Under hood	Under hood

HORSEPOWER	SUPER 77	SUPER 88
HC TRACTORS		
Nebraska Test Number	542	525
Rated Belt	39.25	49.57
Maximum Corrected Belt	46.18	58.08
Rated Drawbar	30.12	37.36
Maximum Corrected Drawbar	40.16	49.81
DIESEL TRACTORS		
Nebraska Test Number	543	527
Rated Belt	39.05	47.29
Maximum Corrected Belt	45.95	55.63
Rated Drawbar	30.03	37.19
Maximum Corrected Drawbar	40.04	49.58

BELT PULLEY (SUPER 77 AND 88)

Width Of Face	7-1/4"
Pulley Diameter	11-7/8"
Speed At 1600 RPM Rated Engine Speed	992 revolutions per minute
Belt Speed At 1600 RPM Rated Engine Speed	3080 feet per minute
Lubrication	Seasonal grade transmission oil

POWER LIFT (SUPER 77 AND 88)

Type	Mechanical
Control	Trip
Lift Time At Engine Rated Speed	1.05 seconds
Length Of Lift	7"
Lubrication	Pressure Gun Grease

HYDRA-LECTRIC AND HYDRAULIC CONTROL (SUPER 77 AND 88)

Pump Operating Pressure	750 pounds per square inch
Pump Capacity At Engine Rated Speed	13 gallons per minute
Type Of Hydraulic Cylinder	Double acting
Inside Diameter Of Cylinder	3" or 4"
Length Of Piston Stroke	8"
Extension Or Retraction Time At Engine Rated Speed	1-1/2 to 2 seconds
Lifting Capacity	
3-Inch Cylinder	5000 pounds
4-Inch Cylinder	9400 pounds
Lubrication	SAE 10W engine oil
Oil Filter Change Period (Part Number 1LA-5351)	1000 hours

FUEL SPECIFICATIONS (SUPER 77 AND 88)

Gasoline

Minimum Octane Rating — 86 Octane ASTM Research Method

Diesel Fuel

	ASTM Spec. For No. 1-D Diesel Fuel	ASTM Spec. For No. 2-D Diesel Fuel
Flash Point	100° F. Minimum	100° F. Minimum
*Pour Point	Minus 20° F. Maximum	Minus 20° F. Maximum
Per Cent of Water and Sediment by Volume	Trace	.10 Maximum
Per Cent of Ash by Weight	.01 Maximum	.02 Maximum
Per Cent of Carbon Residue on 10% Residuum	.15 Maximum	.35 Maximum
**Per Cent of Sulphur by Weight	.50 Maximum	1.0 Maximum
Distillation Temperature	End Point - 625° F. Max.	90% Point - 675° F. Max
Viscosity at 100° F.		45 Sec. S.U. Maximum
		32 Sec. S.U. Minimum
Kinematic Viscosity at 100° F.	1.4 Minimum	
Copper Strip Corrosion	Negative	Negative
***Minimum Cetane Rating	40	40

*For tractor operation in temperatures below minus 10° F., always specify a fuel with a pour point 10° F. below the temperature of the air in which the engine is to operate.

The sulphur content of Diesel fuel is very important. A high sulphur content Diesel fuel requires an engine lubricating oil with high detergent characteristics to prevent carbon build-up in the nozzles and combustion chambers and to neutralize the acid condition created by the higher sulphur content. For these reasons, **the engine lubricating oil recommendations outlined in this manual **are very important.**

***At temperatures below +40° F., specify a fuel with a minimum cetane rating of 50 to 60.

TRANSMISSION SPEEDS IN MPH

ROW CROP AND STANDARD SUPER 77

Trans. Comb. And Tire Size	Engine RPM	GEAR POSITION First	Second	Third	Fourth	Fifth	Sixth	First Reverse	Second Reverse
No. C-2 Regular	800	1.23	1.62	2.14	2.82	3.31	5.77	1.23	2.26
11/50 Bevels	1000	1.54	2.02	2.68	3.53	4.14	7.21	1.62	2.82
11-38 or	1200	1.85	2.43	3.21	4.24	4.96	8.65	1.94	3.39
12.4-38 Tires	1400	2.15	2.84	3.75	4.94	5.79	10.09	2.27	3.95
	1600	2.46	3.24	4.29	5.65	6.62	11.53	2.59	4.52
No. C-5 Special	800	.96	1.38	1.68	2.40	2.82	4.91	1.12	1.92
Low Speed	1000	1.21	1.72	2.10	3.01	3.52	6.14	1.39	2.40
9/48 Bevels	1200	1.45	2.07	2.52	3.61	4.23	7.37	1.67	2.89
11-38 or	1400	1.69	2.42	2.94	4.21	4.94	8.60	1.95	3.37
12.4-38 Tires	1600	1.93	2.76	3.36	4.81	5.64	9.83	2.23	3.85

To obtain travel speeds for alternate tires, multiply above speeds by factor below

Size	Factor
12-38 or 13.6-38	1.029
12-38 Ricefield	1.043

INDUSTRIAL SUPER 77

Trans. Comb. And Tire Size	Engine RPM	GEAR POSITION First	Second	Third	Fourth	Fifth	Sixth	First Reverse	Second Reverse
No. C-14 Regular	800	.99	1.30	1.72	2.26	4.53	7.89	1.04	1.81
11/50 Bevels	1000	1.23	1.62	2.15	2.82	5.66	9.86	1.30	2.26
12.00-24	1200	1.48	1.94	2.58	3.39	6.80	11.83	1.56	2.71
Tires	1400	1.73	2.27	3.00	3.95	7.93	13.80	1.82	3.16
	1600	1.97	2.59	3.43	4.51	9.06	15.78	2.07	3.61
No. C-17 Special	800	.84	1.10	1.46	1.92	3.86	6.72	.88	1.54
Low Speed	1000	1.05	1.38	1.83	2.40	4.83	8.40	1.10	1.92
9/48 Bevels	1200	1.26	1.66	2.19	2.89	5.79	10.08	1.33	2.31
12.00-24 Tires	1400	1.47	1.93	2.56	3.37	6.76	11.77	1.55	2.69
	1600	1.68	2.21	2.93	3.85	7.72	13.45	1.77	3.08

To obtain travel speeds for alternate tires, multiply above speeds by factor below.

Size	Factor
13.00-24	1.036

ORCHARD SUPER 77

Trans. Comb. And Tires Size	Engine RPM	GEAR POSITION First	Second	Third	Fourth	Fifth	Sixth	First Reverse	Second Reverse
No. C-10 Trans.	800	1.30	1.72	2.28	3.00	3.51	6.12	1.38	2.40
13/48 Bevels	1000	1.63	2.16	2.85	3.75	4.39	7.66	1.72	3.00
14-26 Low	1200	1.96	2.59	3.42	4.50	5.27	9.19	2.07	3.60
Profile Tires	1400	2.28	3.02	3.99	5.25	6.15	10.72	2.41	4.20
	1600	2.61	3.45	4.56	6.00	7.03	12.25	2.76	4.80

To obtain travel speeds for alternate tires, multiply above speeds by factor below.

Size	Factor
13-26	.975

ROW CROP AND STANDARD SUPER 88

Trans. Comb. And Tire Size	Engine RPM	GEAR POSITION First	Second	Third	Fourth	Fifth	Sixth	First Reverse	Second Reverse
No. C-1 Regular	800	1.25	1.62	2.15	2.79	3.44	5.90	1.28	2.20
10/47 Bevels	1000	1.56	2.02	2.69	3.49	4.29	7.38	1.60	2.75
12-38 or	1200	1.88	2.43	3.23	4.18	5.15	8.85	1.92	3.30
13.6-38 Tires	1400	2.19	2.84	3.77	4.88	6.01	10.32	2.24	3.85
	1600	2.50	3.24	4.31	5.58	6.87	11.80	2.56	4.40
No. C-4 Special	800	.94	1.34	1.63	2.32	2.85	4.90	1.06	1.82
Low Speed	1000	1.18	1.68	2.04	2.89	3.56	6.12	1.32	2.28
9/51 Bevels	1200	1.42	2.02	2.44	3.47	4.27	7.34	1.59	2.74
12-38 or	1400	1.65	2.35	2.85	4.05	4.98	8.57	1.85	3.19
13.6-38 Tires	1600	1.89	2.69	3.26	4.63	5.69	9.79	2.12	3.65

To obtain travel speeds for alternate tires, multiply above speeds by factor below.

Size	Factor
15.5-38	1.028
15-34	1.031
13-38 Ricefield	1.052
15-34 Ricefield	1.038

INDUSTRIAL SUPER 88

Trans. Comb. And Tires Size	Engine RPM	GEAR POSITION First	Second	Third	Fourth	Fifth	Sixth	First Reverse	Second Reverse
No. C-13 Regular	800	1.00	1.32	1.73	2.24	4.67	8.02	1.03	1.77
10/47 Bevels	1000	1.26	1.64	2.16	2.80	5.84	10.03	1.29	2.21
13.00-24	1200	1.51	1.97	2.60	3.36	7.00	12.04	1.54	2.65
Tires	1400	1.76	2.30	3.03	3.92	8.17	14.04	1.80	3.10
	1600	2.01	2.63	3.46	4.48	9.34	16.05	2.06	3.54
No. C-16 Special	800	.84	1.08	1.44	1.86	3.87	6.66	.85	1.47
Low Speed	1000	1.04	1.35	1.79	2.32	4.84	8.32	1.07	1.84
9/51 Bevels	1200	1.25	1.62	2.15	2.79	5.80	9.98	1.28	2.20
13.00-24	1400	1.46	1.89	2.51	3.26	6.77	11.65	1.49	2.57
Tires	1600	1.67	2.16	2.87	3.72	7.74	13.31	1.71	2.94

To obtain travel speeds for alternate tires, multiply above speeds by factor below.

Size	Factor
14.00-24	1.039
18.00-26	1.204

CALCIUM CHLORIDE AND WATER SOLUTIONS

FRONT TIRES

Tire Size	PROTECTION FOR MINUS 20° F. Pounds of Calcium Chloride	Gallons of Water	Total Weight in Pounds	PROTECTION FOR MINUS 40° F. Pounds of Calcium Chloride	Gallons of Water	Total Weight in Pounds
5.00-15	5	2.5	26	8	2.25	26.75
5.50-16	9.5	4.75	49	15.75	4.5	53.25
6.00-16	9.5	4.75	49	15.75	4.5	53.25
6.50-16	12	6	62	19.25	5.75	67
7.00-20	17	8.5	88	28	8	95
7.50-10	9	4.5	46.5	14	4	47.25
7.50-16	15.5	7.75	80	25.5	7.25	86
7.50-18	16	8	82.5	26.25	7.5	88.75
9.00-10	11	5.5	56.75	17.5	5	59

REAR TIRES

Tire Size	PROTECTION FOR MINUS 20° F. Pounds of Calcium Chloride	Gallons of Water	Total Weight in Pounds	PROTECTION FOR MINUS 40° F. Pounds of Calcium Chloride	Gallons of Water	Total Weight in Pounds
9-38	46	23	237	75	21.5	254
10-38	57	28.5	294	93	26.75	315
11-38	77	38.5	398	126	36.25	428
12.00-24	57	28.5	294	103	29.5	349
12-26	68	34	350	111	31.75	376
12-38	97	48.5	503	159	45.75	540
13.00-24	71	35.75	370	117	33.5	397
13-26	77	38.5	398	126	36.25	428
13-38	116	57.75	596	189	54.25	641
14.00-24	82	41.25	426	135	38.75	458
14-26	103	51.25	531	168	48.25	570
14-30	112	56	577	183	52.50	620
15-30	146	73.25	759	240	69	814
15-34	161	80.5	835	264	75.75	895
18.00-26	204	101.75	1052	333	95.75	1128

TIRE INFLATION PRESSURE AND MAXIMUM LOAD

FRONT TIRES

Tire Size	Ply	20 lb.	24 lb.	28 lb.	32 lb.	36 lb.	40 lb.	44 lb.	50 lb.	55 lb.
5.00-15	4	530	590	650	705	755				
5.50-16	4	655	725	795	860					
6.00-16	4	750	835	915						
6.50-16	6	860	960	1050	1135	12 15	1290			
7.00-20	10						1970	2110	2245	2375 (2500 at 60 lb.)
7.50-10	6	825	915	1000	1080	1160				
7.50-16	6	1110	1235	1345	1455	1560				
7.50-18	6	1205	1340	1465	1585	1700				
9.00-10	8	1080	1200	1315	1425	1525	1620			

REAR TIRES

Tire Size	Ply	12 lb.	14 lb.	16 lb.	18 lb.	20 lb.	22 lb.	24 lb.	26 lb.	28 lb.
9-38	4	1500	1640	1775	1900					
10-38	4	1820	1990	2155						
11-38	4	2185	2390							
11-38	6	2185	2390	2580	2770	2950	3110			
12.00-24	6		2665	2890	3095	3300				
12-26	4		2350							
12-38	6		2810	3040	3260	3470				
13.00-24	6		3120	3380	3640	3870				
13-26	6		2790	3010	3230					
13-38	6		3330	3600	3860					
14.00-24	8			3990	4280	4570	5190			
14-26	6			3680						
14-30	6			3920						
15-30	6			4650						
15-34	6			4940						
18.00-26	10			7290	7807	8325				

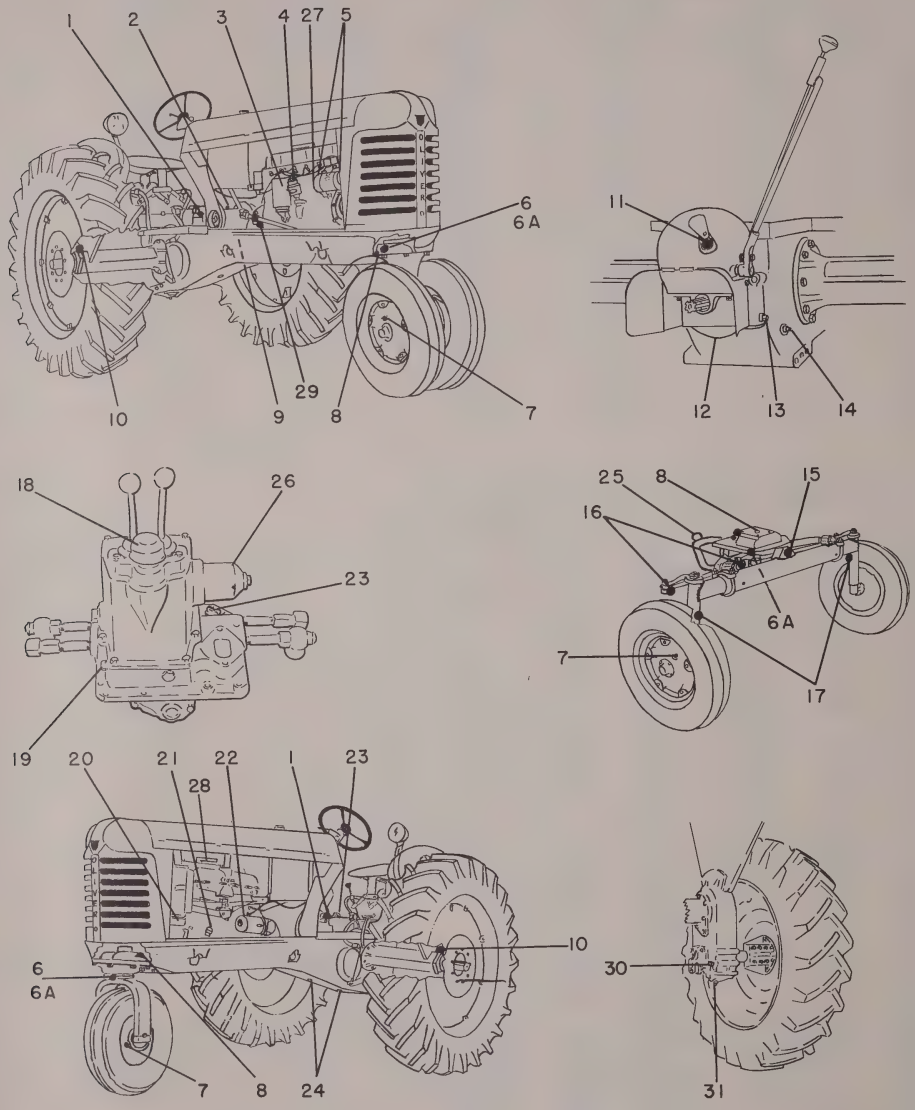


Figure 1-21 Row Crop Lubrication Diagram

ROW CROP LUBRICATION

ITEM NO.	DESCRIPTION	LUBRICANT	NO. OF FITTINGS
	10 HOURS		
1	Power Lift - When in use.	Pressure Gun Grease	2
6	Axle Post Column	Pressure Gun Grease	1
6A	Power Steering Pitman Shaft	Pressure Gun Grease (Single & Dual)	1
		(Adjustable Axle)	2
10	Rear Axle Carrier Bearing	Pressure Gun Grease	2
11	Power Take-Off Clutch Release Bearing - One Stroke Every 10 hours of P.T.O. operation.	Pressure Gun Grease	1
15	Front Axle Pivot	Pressure Gun Grease	1
16	Tie Rod Sockets	Pressure Gun Grease	4
17	Steering Knuckle Pivot	Pressure Gun Grease	2
18	Hydraulic System Bayonet Gauge	SAE 10W Engine Oil	1
18	Hydraulic System Air Breather	Few Drops of SAE 10W Engine Oil	1
20	Air Cleaner Oil Cup	Seasonal Grade Engine Oil	1
21	Crankcase Bayonet Gauge - Add oil when level is below *Working Range.*	Seasonal Grade Engine Oil	1
25	Stay Rod Support	Pressure Gun Grease	1
27	Power Steering Reservoir	SAE 10W Engine Oil	1
29	Clutch Release Bearing	Pressure Gun Grease	1
	60 HOURS		
5	Generator Oil Cups	Few Drops of SAE 20 Engine Oil	2
21	Crankcase Filler Cap	Seasonal Grade Engine Oil	1
	NOTE: Drain and refill HC engines every 90 hours. For winter operation, change HC engine oil every 60 hours and Diesel engine oil every 40 hours.		
	250 HOURS		
8	Steering Housing Filler Test Plug	SAE 90 Gear Lubricant	1
13	Power Take-Off Test Plug - Keep oil level even with plug opening.	Seasonal Grade Gear Lubricant	1
14	Transmission and Final Drive Test Plug - Keep oil 1/2" below plug opening.	Seasonal Grade Gear Lubricant	1
22	Starter - Diesel only	Few Drops of SAE 20 Engine Oil	1
	PERIODIC		
2	Belt Pulley Filler Plug - Add one quart after installing and adter draining.	Seasonal Grade Gear Lubricant	1
3	Oil Filter Element - Add an additional quart of oil when element is replaced.	Replace every fourth oil change	1
4	Distributor Cam Wick - Drop of oil twice yearly.	SAE 10W Engine Oil	1
4	Distributor Shaft Add oil every 500 hours of engine operation.	SAE 20W Engine Oil	1
4	Distributor Breaker Arm Post - Drop of oil twice yearly.	SAE 10W Engine Oil	1
7	Front Wheel Bearings - Remove, clean and repack yearly.	No. 1 Grade Multi-Purpose Lithium or Calcium Base Grease (Single) (Dual)	1 2
9	Belt Pulley Drain Plug - Drain twice yearly.		1
12	Power Take-Off Housing Lower Cover - Remove and clean twice yearly.	Seasonal Grade Gear Lubricant	1
19	Hydraulic System Drain Plug - Drain yearly		1
23	Transmission Filler Cap	Seasonal Grade Gear Lubricant	1
24	Transmission and Final Drive Drain Plugs - Drain twice yearly.		2
26	Hydraulic System Oil Filter - Replace yearly.		1
28	Crankcase Air Breather - Remove and clean twice yearly.	Reoil with Seasonal Grade Engine Oil	1
30	Final Drive Filler Test Plug - Extra high clearnace. Keep oil level with plug opening.	Seasonal Grade Gear Lubricant	2
31	Final Drive Drain Plug - Extra high clearance. Drain twice yearly.		2

NOTE: For Three-Point Hitch lubrication, refer to Section X.

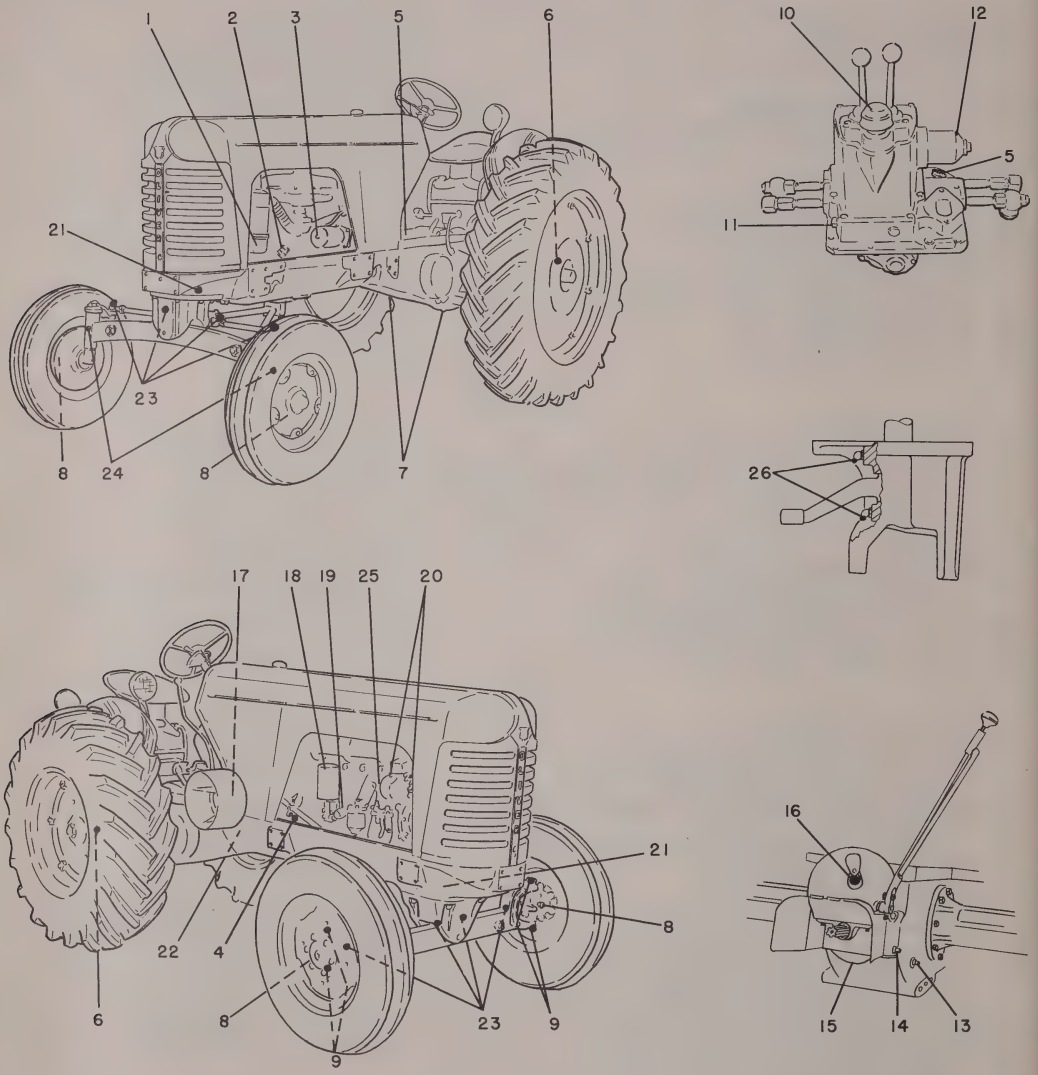


Figure 1-22 Standard And Industrial Lubrication Diagram

20	Generator - No periodic lubrication required	
18	Oil Filter Element - Add two additional quarts of oil when element is replaced	Replace every 300 hours

STANDARD AND INDUSTRIAL LUBRICATION CHART

ITEM NO.	DESCRIPTION	LUBRICANT	NO. OF FITTINGS
	10 HOURS		
1	Air Cleaner Oil Cup	Seasonal Grade Engine Oil	1
2	Crankcase Bayonet Gauge - Add oil when level is below *Working Range.*	Seasonal Grade Engine Oil	1
4	Clutch Release Bearing - One stroke.	Pressure Gun Grease	1
6	Rear Axle Carrier Bearing	Pressure Gun Grease	2
9	Spindle Carrier Pivots	Pressure Gun Grease	4
10	Hydraulic System Bayonet Gauge	SAE 10W Engine Oil	1
10	Hydraulic System Air Breather	Few Drops of SAE 10W Engine Oil	1
16	Power Take-Off Clutch Release Bearing - One stroke every 10 hours of P.T.O. operation.	Pressure Gun Grease	1
23	Tie Rod Sockets	Pressure Gun Grease	4
24	Steering Knuckle Pivot - Standard tractor only.	Pressure Gun Grease	2
25	Power Steering Reservoir	SAE 10W Engine Oil	1
26	Power Steering Pitman Shaft	Pressure Gun Grease	2
	60 HOURS		
2	Crankcase Filler Cap	Seasonal Grade Engine Oil	1
	NOTE: Drain and refill HC engines every 90 hours. For winter operation, change HC engine oil every 60 hours and Diesel engine oil every 40 hours.		
20	Generator Oil Cups	Few Drops of SAE 20 Engine Oil	2
	250 HOURS		
3	Starter - Diesel only.	Few Drops of SAE 20 Engine Oil	1
13	Transmission and Final Drive Test Plug - Keep oil level 1/2" below plug opening.	Seasonal Grade Gear Lubricant	1
14	Power Take-Off Filler Test Plug - Keep oil level even with plug opening.	Seasonal Grade Gear Lubricant	1
21	Steering Housing Test Plug - Mechanical gear only.	SAE 90 Gear Lubricant	1
	PERIODIC		
5	Transmission Filler Cap	Seasonal Grade Gear Lubricant	1
7	Transmission and Final Drive Drain Plugs - Drain twice yearly.		2
8	Front Wheel Bearings - Remove, clean and repack yearly.	No. 1 Grade Multi-Purpose Lithium or Calcium Base Grease	2
11	Hydraulic System Drain Plug - Drain once a year.		1
15	Power Take-Off Housing Lower Cover - Remove and clean twice yearly.	Seasonal Grade Gear Lubricant	1
17	Belt Pulley Filler Plug - Add one quart after installing and after draining.	Seasonal Grade Gear Lubricant	1
18	Oil Filter Element - Add an additional quart of oil when element is replaced.	Replace every fourth oil change.	1
22	Belt Pulley Drain Plug - Drain twice yearly.		1
19	Distributor Cam Wick - Few drops of oil twice yearly.	SAE 10W Engine Oil	1
19	Distributor Breaker Arm Post - Drop of oil twice yearly.	SAE 10W Engine Oil	1
19	Distributor Shaft - Add oil every 500 hours of engine operation.	SAE 20W Engine Oil	1
12	Hydraulic System Oil Filter - Replace yearly.		1

NOTE: For Three-Point Hitch lubrication, refer to Section X.

IMPERIAL AND METRIC MEASURE

All fluid quantites listed in the foregoing specifications are given in U.S. measure. In countries where Imperial or metric measure is used, it will be necessary to convert from U.S. measure to the desired units through the use of conversion factors. Below are some of the more common factors used.

1 U.S. qt. equals.946 liters equals .83 Imperial qt.
1 U.S. gal. equals 3.78 liters equals .83 Imperial gal.
1 pound equals .45 kilogram

To convert U.S. measure to Imperial or metric measure, multiply the U.S. measure by the conversion factor. An example of this calculation is outlined below.

6 U.S. qt. x .946 equals 5.68 liters
6 U.S. qt. x .83 equals 4.98 Imperial qt.
6 pounds x .45 equals 2.7 kilograms

LUBRICATION

Lubrication points and frequency requirements for the Super 77 and 88 Series tractors are given in the foregoing Lubrication Charts. The time intervals indicated on these charts assume normal operating conditions. If the tractor is operated under adverse conditions, it will be necessary to lubricate it more frequently. Grease fittings are provided at all points requiring pressure gun lubrication and are designated by black dots on the charts.

Use quality oils and greases furnished by a reliable manufacturer and be sure to use the proper oil or grease for the particular type of lubrication required. Keep these lubricants in clean covered containers and see that funnels, measurers and similar handling equipment are clean before using them. Clean all fittings, plug openings, oil cups and other points of lubrication before servicing. Inspect plugs and other detachable fittings to see that they are clean before reinstalling them on the tractor.

NEVER OPERATE THE ENGINE IN A CLOSED SHED OR GARAGE

ENGINE LUBRICATION

The Standardized Military Engine has a Pressure-Mist lubrication system.

SECTION II

ENGINE

ENGINE LUBRICATION

The lubrication system on Oliver Super 77 and 88 Series tractor engines is called a *Metering Lubrication System* or a *Low Pressure Spurt System.* (See Figure 2-1.) Oil is supplied to the crankshaft main bearings under pressure by a rotary, vane type oil pump. From these bearings, the oil is metered in timed spurts into oil galleries and passages that deliver it to all points requiring lubrication.

The oil level should be checked daily and replenished, if necessary, to maintain the level within the limits of the *Working Range* on the bayonet gauge. (See Figure 2-2.)

The most satisfactory engine lubrication will be obtained when using good quality oils of the proper grade and classification as outlined in the following discussion.

NOTE

USE ONLY OILS THAT ARE DESIGNATED *FOR SERVICE DM* OR *FOR SERVICE DS* IN OLIVER DIESEL ENGINES.

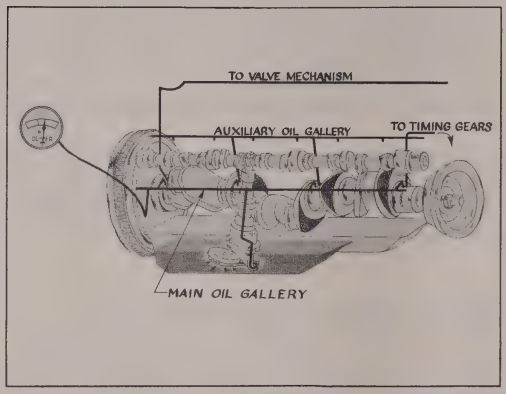


Figure 2-1 Engine Lubrication Schematic Diagram

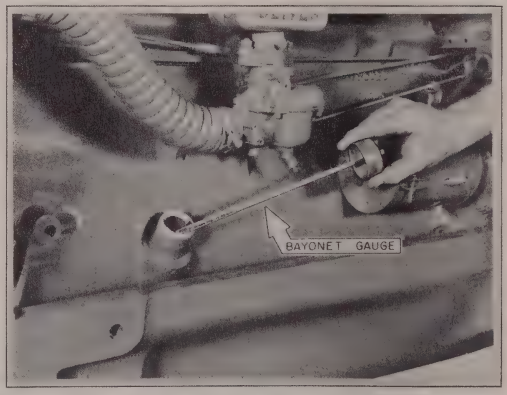


Figure 2-2 Checking Crankcase Oil Level

ENGINE LUBRICATING OILS

Engine lubricating oils are sold by SAE grades and are classified by the A.P.I. (American Petroleum Institute) into six different classes to designate the type of service for which the oil is intended. Diesel engine oils are also covered by I.C.E.I. (Internal Combustion Engine Institute) classifications.

The A.P.I. oil designations of *ML, MM* and *MS* refer to oils intended for use in automotive or spark ignition engines. The A.P.I. designations of *DG, DM* and *DS* or I.C.E.I. type *A, B* and *C* classifications are for Diesel engines. Oil recommendations and the method of applying these symbols to your tractor are outlined below.

An oil may be designated with more than one classification, meaning that it has been refined to be suitable for more than one type of service.

HC ENGINE LUBRICATING OIL

For Service ML - Light Duty Service - It is possible an oil of this classification could be used in an Oliver HC engine, but it is not recommended in view of the varied service conditions under which a tractor operates.

For Service MM - Moderate Duty Service - For tractors operating under rated load, on a high grade fuel and at normal engine temperatures.

For Service MS - Severe Duty Service - Where high grade fuel is not available, the tractor is used intermittently in cold weather, engine consistently operates at temperatures above or below normal, or the engine is allowed to idle for long periods.

Service *DG*, *DM* and *DS* or type *A*, *B* and *C* oils designed for Diesel engine operation may also be used in Oliver HC engines, but they are not usually required.

DIESEL ENGINE LUBRICATING OIL

For Service DG or Type A - General Duty Service - With varied operating conditions of Diesel tractors, this service oil **is no longer** recommended for Oliver Diesel engines. We now recommend *DM* or type *B* in place of *DG* or type *A*.

For Service DM or Type B - Moderate Duty Service - For tractors operating under rated load at rated speed and at normal temperatures using fuel which meets A.S.T.M. specification for 1-D Diesel fuel.

For Service DS or Type C - Severe Duty Service - For tractors operating under heavy loads, above or below normal engine temperatures, with fuel which meets A.S.T.M. specification for 2-D Diesel fuel under normal operating temperatures, or intermittent cold weather operations with fuel which meets A.S.T.M. specification for 1-D Diesel fuel.

It is permissible to use a nondetergent crankcase oil of *MM* service A.P.I. classification of the recommended SAE grade specified for the season, for one oil change period, when breaking in a new Oliver Diesel tractor where the tractor is used according to our break-in recommendation in order to seat the piston rings.

OIL CHANGE PERIODS

It is imperative that the engine lubricating oil be changed at the specified intervals if the engine is to operate at peak efficiency for long periods. Quality lubricating oils produced by reliable manufacturers contain additives to improve their performance. As the oil is used in an engine, these additives gradually become depleted, rendering the oil ineffective for performing the job it was intended to do. For this reason, change the oil in HC engines every 90 hours of tractor operation and every 60 hours of tractor operation in Diesel engines. For winter operation with complete engine warm up, change the HC engine oil every 60 hours and Diesel engine oil every 40 hours.

ENGINE OIL GRADES

The engine oil recommendations are as follows:

Air Temperature	SAE Grade	HC A.P.I. Classification	Diesel A.P.I. Classification	Diesel I.C.E.I. Classification
Above +32° F.	20, 20W or 10W-30	MM or MS	*DM	*Type B
Above +10 to 32° F.	10W or 5W-20	MM or MS	*DM	*Type B
Below +10° F.	5W or 5W-20	MM or MS	*DM	*Type B

*When using a No. 2-D fuel, use *DS* or type *C* oil. If 5W or 5W-20 oil is not available in *DM* or type *B* classification, use *MS*, *DG* or type *A* during cold weather where starting might be a problem and change more frequently than specified below.

OIL CHANGE PERIODS

The engine oil is to be changed every 50 hours of tractor operation.

OIL FILTER

The Michiana oil filter on the Military tractor conforms to U.S. Navy specifications FF-35 and U.S. Army specification FF-351.

SERVICING

Replace the oil filter element with a Military Standard Service element or Michiana's element part number 31-3100 every 100 hours of tractor operation. After a new element has been installed, it is necessary to add two additional quarts of oil to the engine crankcase.

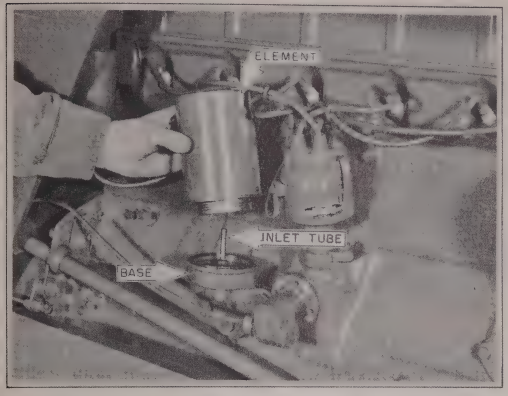


Figure 2-3 Removing Oil Filtering Element

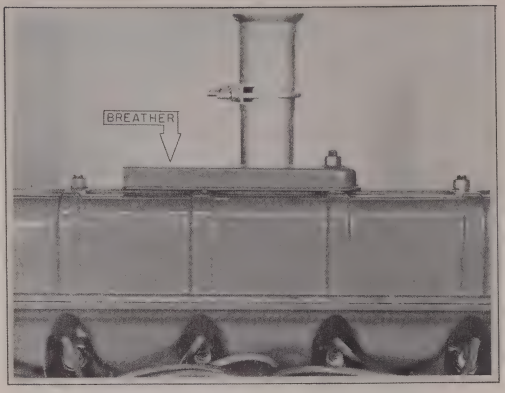


Figure 2-4 Crankcase Breather

Under adverse operating conditions, the engine oil should be changed more frequently than the specified intervals. For intermittent winter operation without complete engine warm up or under very dusty conditions, change HC engine oil every 45 hours and Diesel engine oil every 30 hours of tractor operation. Refer to Service Periods and Cold Weather Operation in Section I.

NOTE

ALWAYS DRAIN THE OIL WHEN THE ENGINE IS WARM SO THAT THE OIL WILL FLOW FREELY.

OIL FILTER

The oil filter consists of a pleated paper filtering element turned into a base casting attached to the right side of the engine. (See Figure 2-3.) Oil from the main oil gallery enters the filter through the oil inlet tube, passes through the element and returns to the crankcase through a hole in the casting.

SERVICING

Replace the oil filtering element, part number 100 125-A for the Super 77 and 88 Diesel tractor, or 100 126-A for the Super 77 and 88 HC tractor, every fourth oil change.

To replace the oil filtering element, clean away the dirt from around the filter and base casting. Remove the element from the base casting by turning it in a counterclockwise direction. (See Figure 2-3.) Check the condition of the rubber gasket in the casting to make sure that it forms a smooth sealing surface.

Position the new oil filtering element over the oil inlet tube and turn it securely into the base casting to complete the installation.

After a new element has been installed, it is necessary to pour an additional quart of oil into the engine crankcase to replace the oil pumped into the new element.

DO NOT USE SUBSTITUTE FILTERS.

BREATHER

The breather attached to the cylinder head cover equalizes the pressure inside and outside the engine crankcase. (See Figure 2-4.) Remove the breather every six months and wash it in a cleaning solvent to prevent it from becoming clogged and restricting the escape of gases from within the engine. Oil the metal wool inside the breather with a few drops of engine oil, and reinstall it on the cylinder head cover.

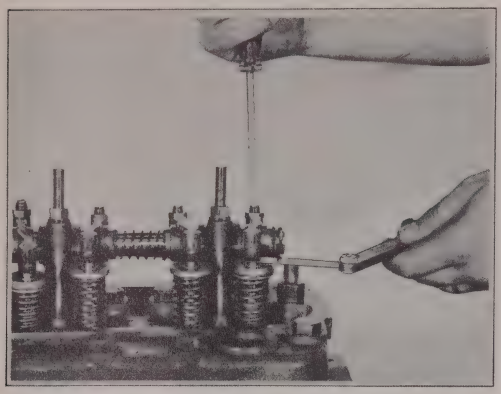


Figure 2-5 Valve Clearance Adjustment

VALVE CLEARANCE

The valve clearance of your tractor engine will require occasional adjustment to compensate for the small amount of wear that takes place throughout the valve operating mechanism. If the clearance becomes too great, the valves will not be held open long enough to allow the proper amount of air or fuel-air mixture to enter the combustion chambers, or the exhaust gases to escape. If the valve clearance is insufficient, the valves will not seat properly, this causes improper cooling which results in burned valves and valve seats. In either case of improper clearance, loss of power will result.

Adjust the valves to the recommended clearance as outlined in Section I under Specifications. These clearances are for adjusting the valves when the engine is cold or at room temperature, which is considered to be approximately 70° F. No hot setting of the clearance is listed because adjusting the valves when the engine is running is not recommended.

The valve at the front of the engine is an exhaust valve. The next two are intake valves, and the following pair are exhaust. The valves continue in alternate pairs until the last valve at the rear of the engine. This is another exhaust valve.

VALVE CLEARANCE ADJUSTMENT

To adjust the valve clearance, proceed as follows:

1. Remove the hood side panels, hood, air breather and cylinder head cover from the tractor.

2. Turn the engine slowly until the intake valve for the number one cylinder closes. Continue to turn the engine an additional 145 degrees or from 1/4 to 1/2 turn. At this point both valves for the number one cylinder are completely closed and their clearance may be adjusted.

3. Loosen the lock nut on the rocker arm adjusting screw.

4. Insert a feeler gauge of the correct thickness between the valve stem tip and the rocker arm contact button.

5. Turn the adjusting screw with a screw driver until the feeler gauge will just slide in and out of the gap between the valve stem tip and rocker arm contact button. (See Figure 2-5.)

6. Tighten the lock nut and recheck the valve clearance.

7. Turn the engine slowly and position the valves for the number two cylinder in the same manner as outlined for the number one cylinder. Then proceed to adjust the intake and exhaust valves for that cylinder. Repeat this procedure with the remaining cylinders until all of the valves have been adjusted to the proper clearance.

ENGINE TROUBLE SHOOTING

ENGINE FAILS TO START

1. Diesel fuel stop control stuck in the out position.

2. Fuel tank empty or fuel shutoff valve closed - Check fuel level and make sure valves are open before attempting to start the engine.

3. Faulty ignition - Check ignition system by removing one spark plug wire and holding it 1/4 inch from the engine head. When the engine is cranked, a blue spark should jump the gap. If the spark is weak, have the coil and condenser checked. If there is no spark, check for loose and broken connections.

4. Dirty, pitted or burned distributor points - Check the condition of the distributor points. If they are pitted or burned, replace with new points. If the points are dirty, file them clean and reset the point opening to .022 inch. Never use emery paper to clean distributor points.

5. Battery cables loose or broken - Check or replace the cables.

6. Spark Plug wires damp, dirty or oil soaked - Wipe all dirt, oil and moisture from the wires. Replace ignition wires where necessary.

7. Spark plugs dirty - Remove and clean the spark plugs. Check and reset spark gap to .025 inch. Replace all plugs that have cracked or damaged insulators.

8. Cracked distributor cover - Replace with a new cover.

9. Fuel lines plugged - Remove and clean the fuel lines and fuel strainer assemblies.

10. Distributor rotor broken, worn or grounded - Check and replace where necessary.

11. Faulty ignition switch - Check for loose, broken or burned contacts.

12. Cranking speed too slow - Battery must be in good condition to start the engine, especially in cold weather.

13. Gasoline in carburetor but not in cylinders - Drain and refill the carburetor several times. If this does not clear the obstruction, have the carburetor checked by an Oliver service man.

14. Fuel with too high a viscosity being used in the Diesel engine - Fuel with a high viscosity thickens in cold weather.

15. Air in Diesel fuel lines - Bleed fuel system as outlined in Section III.

16. Diesel fuel filter clogged - Replace the filter element.

17. Fuel with too low a cetane rating being used - Do not use a fuel with a cetane rating less than 40 in the Diesel engine.

ENGINE FAILS TO DEVELOP FULL POWER

1. Spark plugs dirty - Clean plugs and reset spark gap to .025 inch.

2. Air cleaner dirty - Wash the air cleaner in cleaning solvent and change the oil in the cup.

3. Oil in air cleaner cup too heavy - Change the oil to the same grade as that used in the engine crankcase.

4. Vent in fuel tank cover obstructed - Wash the cap in a cleaning solvent.

5. Engine running too cold - Check the thermostat and cover the radiator, if necessary.

6. Engine running too hot - Check the thermostat and cooling system.

7. Improper fuel - Check the fuel specifications and make sure the proper fuel is being used.

8. Ignition out-of-time - Adjust the ignition timing as outlined in Section IV.

9. Weak coil, faulty condenser or poorly insulated ignition wires - Check the ignition system and repair where necessary.

10. Carburetor improperly adjusted - Adjust the carburetor as outlined in Section III.

11. Valves improperly adjusted - Adjust the valve clearance.

12. Governor improperly adjusted - Adjust the governor as outlined in Section III.

13. Clogged fuel strainers or filters - Clean the fuel strainers or replace the fuel filters.

14. Diesel fuel viscosity too low which causes the injection pump to slip - Use a fuel with a higher viscosity.

15. Ground speed too fast - Shift the transmission into a lower gear to avoid overloading the engine.

16. Exhaust muffler clogged - Replace muffler.

17. Clutch slipping - Have the clutch overhauled.

ENGINE OVERHEATING

1. Cooling system liquid too low - Fill the cooling system to 1-1/2 inches below the level of the radiator overflow pipe.
2. Tractor overloaded - Use lower transmission speed.
3. Fan belt loose or badly worn - Check and adjust the fan belt. Replace the belt if it is cracked or frayed.
4. Clogged or collapsed radiator hose - Replace the hose.
5. Defective thermostat - Have the thermostat removed and checked. Do not operate the tractor without a thermostat.
6. Engine oil too heavy - Use seasonal grade engine oil.
7. Carburetor improperly adjusted - Adjust the carburetor as outlined in Section III.
8. Incorrect ignition timing - Time the engine as outlined in Section IV.
9. Defective water pump - Have the water pump checked by your Oliver service man.
10. Clogged muffler - Replace the muffler.
11. Brakes dragging - Adjust the brakes as outlined in Section VII.
12. Improper fuel - Use fuels that meet the specifications in Section I.
13. Defective temperature gauge - Have the gauge checked.
14. Improper spark plugs - Use spark plugs of the correct heat range.
15. Oil level in crankcase too low - Check and add oil if necessary.

EXCESSIVE FUEL CONSUMPTION

1. Choke valve closed - Do not have the choke control pulled out any farther than is necessary.
2. Air intake clogged or air cleaner plugged - Clean the air intake screen. Remove and wash the air cleaner in a cleaning solvent and change the oil in the cup.
3. Fuel lines leaking - Check all fuel lines and stop all leaks.
4. Carburetor improperly adjusted - Adjust the carburetor as outlined in Section III.
5. Carburetor float sticking - Have your Oliver service man check the carburetor.
6. Incorrect ignition timing - Adjust the timing as outlined in Section IV.
7. Improper grade and quality of fuel being used - Check the specifications in Section I for the proper grade of fuel to be burned.
8. Engine overloaded - Use engine on rated loads only for the best fuel economy.

EXCESSIVE OIL CONSUMPTION

1. Improper grade of oil being used - Use only seasonal grade engine oil.
2. Crankcase oil diluted - Drain crankcase oil and refill with seasonal grade engine oil.
3. Engine temperature too high - Check engine for overheating.
4. Gaskets leaking - Replace all leaking gaskets.
5. Oil pressure too high - Have your Oliver service man check the oil pressure relief valve.
6. Oil pan drain plug loose - Tighten the oil pan drain plug.

ENGINE MISFIRES

1. Dirty, cracked or grounded spark plugs - Check and regap spark plugs. Replace plugs where necessary.
2. Distributor cap cracked - Replace cap.
3. Grounded spark plug wires - Check wires for breaks in the insulation.

4. Weak ignition coil or condenser - Have the coil and condenser checked by your Oliver Dealer.

5. Carburetor improperly adjusted - Adjust the carburetor as outlined in Section III.

6. Water in fuel - Drain fuel tank and refill with clean fuel.

7. Burned or sticking valves - Have your Oliver Dealer grind and reseat the valves.

8. Carburetor dirty - Have your Oliver service man clean and adjust the carburetor.

9. Intake manifold leaking - Check and tighten all nuts and cap screws.

IRREGULAR ENGINE SPEED

1. Governor improperly adjusted - Adjust the governor as outlined in Section III.

2. Carburetor improperly adjusted - Adjust the carburetor as outlined in Section III.

3. Throttle shaft linkage from the governor to carburetor damaged - Repair or replace throttle shaft linkage.

4. Improper spark plug gap - Remove, clean and regap the spark plugs.

5. Irregular spark - Check distributor points, and have the coil and condenser checked.

6. Clutch or drive belt slipping - Tighten drive belt, or adjust the clutch as outlined in Section VI.

7. Governor action slow - Have the governor removed, cleaned and repaired.

8. Diesel engine surges or smokes - Increase engine speed.

ENGINE BACKFIRES

1. Dirty or broken spark plugs - Remove, clean and adjust the spark plugs. Replace damaged plugs with new spark plugs.

2. Wires improperly installed in distributor cap - Check firing order of engine and install wires in distributor cap accordingly.

3. Distributor points burned, pitted or dirty - Replace burned or pitted distributor points. Clean dirty points and adjust opening to .022 inch.

4. Fuel mixture to lean - Adjust carburetor as outlined in Section III.

5. Incorrect ignition timing - Time the ignition as outlined in Section IV.

6. Distributor advance weights sticking - Have your Oliver service man check the distributor.

POOR ACCELERATION

1. Improper fuel - Use only fuels that meet the specifications in Section I.

2. Incorrect ignition timing - Adjust the timing as outlined in Section IV.

3. Improper carburetor adjustment - Adjust the carburetor as outlined in Section III.

NEVER ATTEMPT TO MAKE ADJUSTMENTS WHILE TRACTOR

IS IN MOTION

BE SURE GEAR SHIFT IS IN NEUTRAL BEFORE STARTING ENGINE

SECTION III

FUEL SYSTEM

GENERAL

The fuel system on Oliver Super 77 and 88 HC tractor engines consists of a fuel tank, fuel strainer, fuel lines and connections, carburetor, air cleaner, governor and manifolds. The purpose of this system is to provide storage, mix the fuel with the required amount of clean air and deliver the fuel-air mixture to the engine cylinders.

The Diesel engine fuel system differs from that on HC engines because it utilizes the principle of solid injection and compression ignition instead of carburetion and spark ignition. This Diesel engine fuel system consists of a fuel tank, two fuel strainers, two fuel filters, tubing and connections, fuel pump, air cleaner, injection nozzles and energy cells, and manifolds. The function of this system is to provide storage, begin and end the injection process sharply, inject the correct amount of fuel into the engine cylinders at the right time and rate, and atomize and distribute the fuel charge throughout the combustion chamber. It also must deliver into the engine cylinders an ample supply of clean air prior to the fuel injection process.

A weather cap is installed on the exhaust pipe to prevent moisture and dirt from entering the engine through the exhaust system. (See Figure 3-1.) This cap is opened by the exhaust gases when the engine is started, and it drops into the closed position to cover the exhaust pipe opening when the engine is stopped.

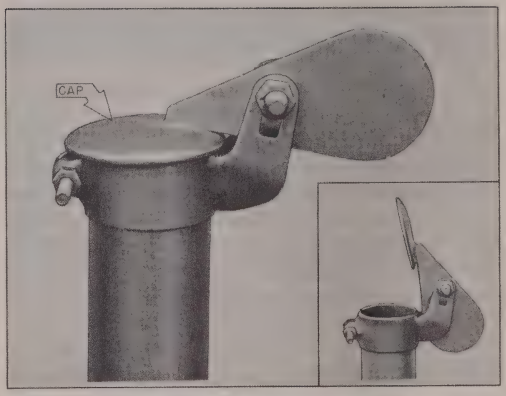


Figure 3-1 Weather Cap

FUELS

Your tractor engine is designed to burn fuels that satisfactorily meet the minimum requirements listed in Section I under Fuel Specifications. Always use high grade fuels purchased from a reputable dealer and you will be generously rewarded with more power, smooth operation, greater fuel economy and less repair expense.

The fuel recommended for Oliver Super 77 and 88 Diesel tractors is commonly known as No. 1 Diesel fuel. The specifications for this fuel, which are generally met by the major oil companies, are listed in Section I.

For lubrication of Diesel engines burning the no. 1 Diesel fuel, procure a high grade engine oil that is suitable for service DM or DS.

Use a No. 1 Diesel fuel that has a minimum cetane rating of 50 to 60 for satisfactory starting and performance at temperatures below 40° Fahrenheit.

During warm seasons when the tractor is operating under heavy sustained loads, it is permissible to use a second grade or No. 2 Diesel fuel providing it meets the specifications outlined in Section I for No. 2-D Diesel fuel.

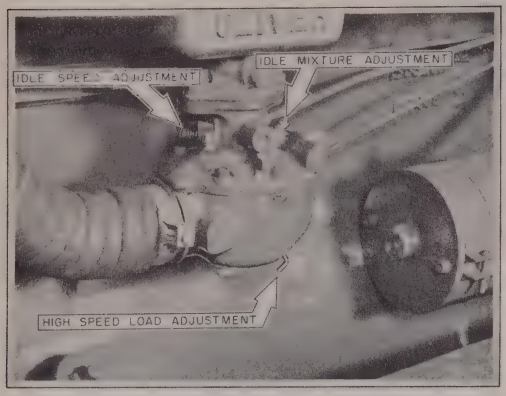


Figure 3-2 Schebler Carburetor Adjustments

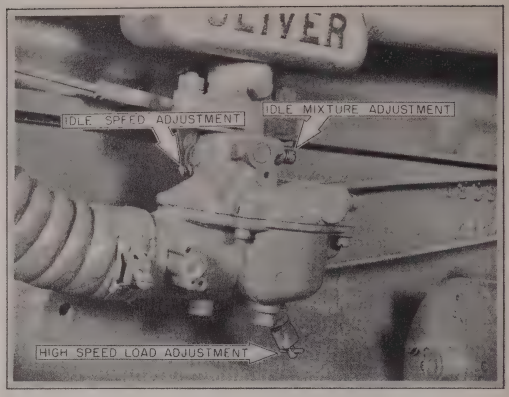


Figure 3-3 Zenith Carburetor Adjustments

When an Oliver Diesel engine is operated on a second grade Diesel fuel, it is necessary to use an engine oil that is suitable for service DS. This type of motor oil combats the detrimental effects caused by the increased products of combustion resulting from the use of a lower grade fuel.

FUEL STORAGE

It is very important that the fuel burned in your tractor engine is kept clean and free of dust, dirt, water and other foreign material. For this reason, we suggest that all fuel be stored and handled in clean containers. Your fuel supplier and Oliver Dealer will welcome the opportunity to assist you in properly selecting, setting up and caring for your bulk fuel supply.

In storing and handling Diesel fuel, it is of utmost importance that the fuel does not contact any more containers than is absolutely necessary so that the possibility of dirty fuel being placed in the fuel tank can be reduced to a minimum. Excessive dirt and water in the fuel strainer assemblies of your tractor are one indication that a sanitary system of storing and handling the fuel is not being followed.

Always wait twenty-four hours before removing fuel from storage tanks that have been refilled. When the tanks are filled, any dirt and water deposits on the bottom of the tank are stirred up and held in suspension by the fuel. If fuel is withdrawn before these deposits have had time to settle, foreign material will be placed in the tractor fuel tank.

CAUTION

AVOID OVERFILLING THE TRACTOR FUEL TANK BECAUSE THE EXCESS FUEL MAY CONTACT AND DAMAGE THE BATTERY OR BATTERIES AND THE INSULATION ON ELECTRICAL WIRING.

HC FUEL SYSTEM

CARBURETOR

Super 77 and 88 HC engines are equipped with either a Schebler or a Zenith updraft carburetor in which the fuel-air mixture moves upward into the intake manifold. This principle of air movement produces efficient vaporization and minimizes the tendency toward drawing liquid fuel into the engine cylinders.

The engine carburetor is provided with three adjustments, the idling mixture adjustment, idle speed adjustment and the high speed load adjustment. (See Figures 3-2 and 3-3.) When making these carburetor adjustments, always warm up the engine and adjust the idling mixture before setting the idle speed or high speed load adjustment.

IDLING MIXTURE ADJUSTMENT

The purpose of the idling mixture adjustment is to vary the fuel-air ratio of the mixture entering the engine cylinders so that a smooth engine idle may be obtained.

Before setting the idle mixture adjustment, it is advisable to check the carburetor, air cleaner and intake manifold for air leaks. Also inspect the ignition system to see that it is not the cause of improper engine operation.

The idling mixture adjustment is made by means of a needle valve above the carburetor float chamber near the carburetor throat. (See Figures 3-2 and 3-3.) Turn this needle valve in slowly, enriching the fuel-air mixture, until the engine begins to lose speed. Then turn the valve out, leaning the fuel-air mixture, until the engine again begins to slow down. Use 1/8 turns when adjusting the needle valve and allow sufficient time between each change for the engine to adjust itself to the new setting. Occasionally race the engine to about 1000 revolutions per minute to clear the combustion chambers of excess fuel. Continue adjusting the needle valve in and out until the maximum idle speed is determined. Finally race the engine for a few seconds and note if it returns to a smooth idle. After the idling mixture has been adjusted, set the engine idle speed as outlined in the paragraph on Idle Speed Adjustment.

IDLE SPEED ADJUSTMENT

The engine idle speed is adjusted by means of a screw on the throttle control lever. (See Figures 3-2 and 3-3.) By turning this screw clockwise or counterclockwise, the idle speed may be increased or decreased. The engine idle speed at closed throttle should be 350 — 400 revolutions per minute. This is equivalent to 217 — 248 revolutions per minute of the belt pulley shaft or 117 — 133 revolutions per minute of the power take-off shaft.

To adjust the engine idle speed, proceed as follows:

1. Start the engine and allow it to warm up to operating temperature.
2. Place the governor control lever at the top of the governor control quadrant.
3. Engage the belt pulley or the power take-off.
4. Check the revolutions per minute of the belt pulley or power take-off shaft with a tachometer or a revolution counter and a stop watch.
5. Turn the idle speed adjusting screw to increase or decrease the engine speed as required.
6. Recheck the revolutions per minute of the belt pulley or power take-off shaft.
7. Repeat this procedure until the engine idles at 350 — 400 revolutions per minute.

HIGH SPEED LOAD ADJUSTMENT

The purpose of the high speed load adjustment is to permit carburetor settings to compensate for variations in fuel quality, atmospheric conditions and loads.

To make the adjustment, warm up the engine and place it under load. Slowly turn the needle valve in, leaning the fuel-air mixture, until the engine begins to lose power. (See Figures 3-2 and 3-3.) Then slowly turn the needle valve out until full power is regained. Repeat this procedure several times until you have definitely established the best possible setting for pulling the load. If it is impossible to make the adjustment while the tractor is under a stationary load, the tractor must be operated under a drawbar load after each individual setting.

CAUTION

DO NOT ATTEMPT TO MAKE THE CARBURETOR HIGH SPEED LOAD ADJUSTMENT WHEN THE TRACTOR IS IN MOTION.

GOVERNOR

The governor on Super 77 and 88 Oliver HC engines is a variable speed, fly-weight type designed to maintain constant engine speed under varying load conditions. This governor controls the carburetor throttle independently which provides smooth, even power over the complete range of engine speeds.

The governor is provided with three adjustments: the governor linkage adjustment, the governor high speed adjustment and the governor bumper screw adjustment.

GOVERNOR LINKAGE ADJUSTMENT

The governor linkage adjustment is provided to allow the governor to act over the complete range or engine speeds. This linkage will not normally require adjustment unless the carburetor has been removed or the linkage has been altered or damaged.

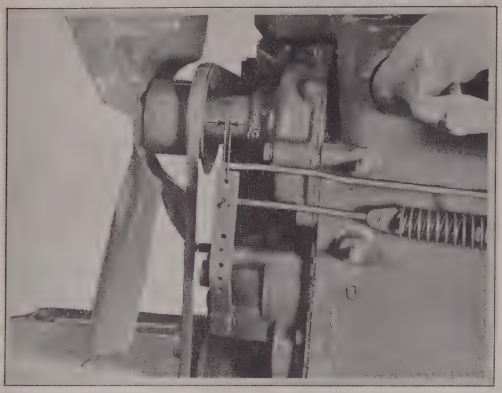


Figure 3-4 Governor Linkage Adjustment

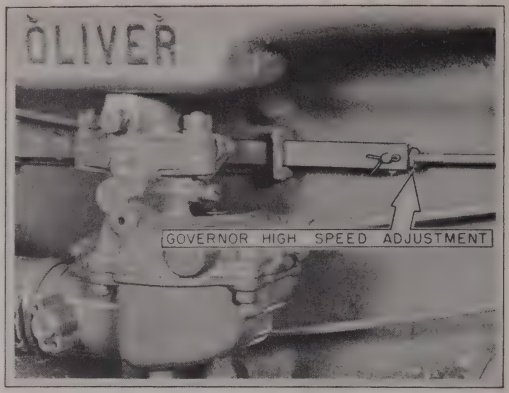


Figure 3-5 Governor High Speed Adjustment

To adjust the governor linkage, proceed as follows:

1. Remove the air cleaner.
2. Loosen the rod end locking nut on the governor to carburetor rod.
3. Place the governor control lever at the bottom of the governor control quadrant on the steering column.
4. Remove the governor to carburetor rod from the governor operating lever. (See Figure 3-4.)
5. Turn the governor to carburetor rod in or out of the rod end until the rod is 1/16 inch forward of the top hole in the governor operating lever when the carburetor throttle is in the wide open position.
6. Reinstall the governor to carburetor rod in the top hole of the governor operating lever, securing it in place with a cotter pin.
7. Tighten the rod end locking nut on the governor to carburetor rod.
8. Start the engine and set the idle mixture and idle speed adjustments at the carburetor.

GOVERNOR HIGH SPEED ADJUSTMENT

The governor high speed adjustment corrects the high no-load speed of the engine so that it runs at 1750 revolutions per minute. This adjustment is obtained by varying the length of the governor control rods in the following manner:

1. Loosen the lock nut and turn out the bumper screw in the front of the governor housing until it releases the governor operating lever when the governor control lever is at the top of the governor control quadrant.
2. Place the governor control lever at the bottom of the governor control quadrant.
3. Start the engine and check the revolutions per minute of either the power take-off or belt pulley shaft with a tachometer or a revolution counter and a stop watch.
4. Stop the engine.
5. Remove the cotter pin and disconnect the rear governor control rod from the front governor control rod.
6. Loosen the rear governor control rod lock nut. (See Figure 3-5.)
7. Turn the adjusting nut on the threaded portion of the rear governor control rod clockwise or counterclockwise to increase or decrease the high no-load speed.
8. Connect the front governor control rod to the rear governor control rod, install the cotter pin and tighten the lock nut.
9. Start the engine and recheck the speed of the belt pulley or power take-off shaft.

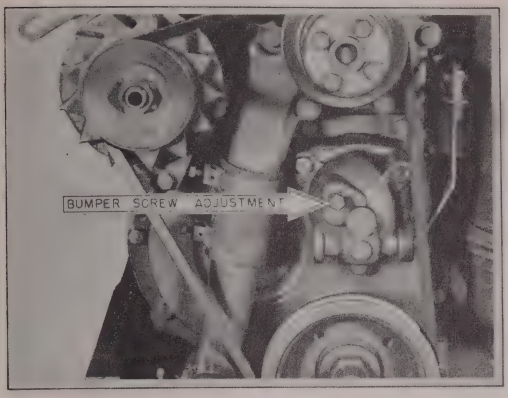


Figure 3-6 Governor Bumper Screw Adjustment

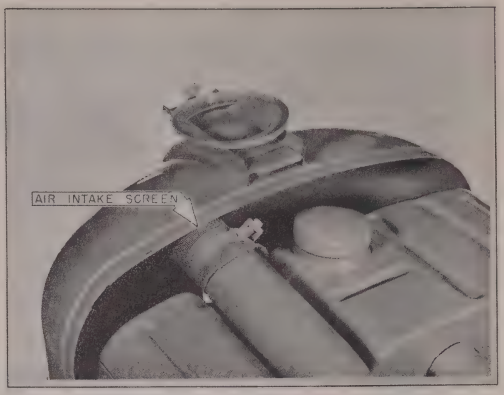


Figure 3-7 Air Intake Screen

10. Repeat this procedure until the engine high-no-load speed is 1750 revolutions per minute.

The following table outlines the relative speeds of the engine, belt pulley and power take-off shaft for setting the governor high no-load speed.

Engine High No-Load Speed	1750 rpm
Belt Pulley Shaft Speed	1086 rpm
Power Take-Off Shaft Speed	583 rpm

GOVERNOR BUMPER SCREW ADJUSTMENT

After the governor high speed adjustment has been completed, there may be a tendency for the engine to surge because of overtravel in the governor operating lever. To eliminate this surging, stop the engine, loosen the lock nut and turn the bumper screw in a little at a time (approximately 1/8 of a turn) until the engine no longer surges. (See Figure 3-6.) It may be necessary to repeat this procedure several times to eliminate the surging and to obtain the desired effect. Turning the bumper screw in may tend to increase the engine idle speed, therefore do not screw it in any farther than is absolutely necessary. Tighten the bumper screw lock nut after the engine is operating satisfactorily.

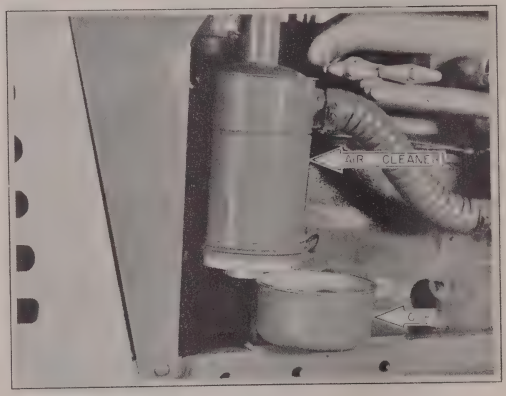


Figure 3-8 Air Cleaner Oil Cup Removed

AIR CLEANER

Each of the Super 77 and 88 Series tractor engines is equipped with an oil-bath type air cleaner. The function of this air cleaner is to remove all foreign material from the air before it enters the carburetor and engine cylinders. Chaff, leaves and insects are removed from the incoming air by the screen over the end of the air intake pipe in front of the radiator. (See Figure 3-7.) Smaller particles of dirt are removed by the oil in the cup attached to the base of the cleaner and the fine mesh screen in the air cleaner body. HC and Diesel engine air cleaners are identical in function, but differ in the size and the location of their intake and outlet.

CAUTION

DO NOT REMOVE THE AIR CLEANER OIL CUP WHILE THE TRACTOR IS RUNNING.

AIR CLEANER SERVICING

The air cleaner requires servicing daily under normal operating conditions. If extremely dusty and dirty conditions are encountered, it will require servicing twice a day. The proper procedure for servicing the air cleaner is as follows:

1. Remove the cup and pour out the oil. (See Figure 3-8.)
2. Wash the cup in kerosene or other cleaning solvent. Be sure that all the caked dirt is removed from the bottom of the cup.
3. Examine the filtering element and center tube in the air cleaner body. If either is dirty, remove the air cleaner from the tractor and rinse it in a cleaning solvent.
4. Reinstall the air cleaner on the engine.
5. Fill the cup to the *Oil Level* mark with new oil of the same viscosity as that used in the engine crankcase.
6. Install the cup on the air cleaner.

WARNING

TOO MUCH OIL IN THE DIESEL ENGINE AIR CLEANER OIL CUP IS EXTREMELY DANGEROUS. OIL DRAWN FROM THE CUP INTO THE ENGINE CYLINDERS PROVIDES AN UNCONTROLLED SUPPLY OF FUEL WHICH WILL CAUSE A RUNAWAY ENGINE.

FUEL STRAINER ASSEMBLIES

Oliver Super 77 and 88 HC tractors have a screen type fuel strainer assembly directly below the fuel tank for removing dirt and other foreign material from the fuel as it flows to the carburetor as shown in Figure 3-9. Diesel tractors have a screen type fuel strainer assembly below the fuel tank and an edge type strainer as an integral part of the fuel supply pump. (See Figures 3-9 and 3-12.) A valve in the body of the fuel strainer assembly under the fuel tank is provided on both HC and Diesel tractors for turning off the fuel when performing service operations.

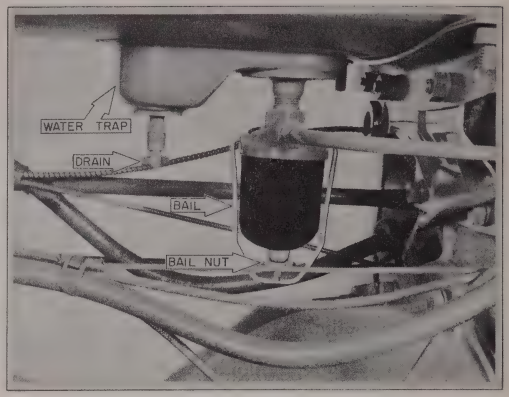


Figure 3-9 Diesel Fuel Strainer Assembly And Water Trap

SERVICING FUEL STRAINER ASSEMBLIES

The screen type fuel strainer assembly on HC tractors and both the edge type and screen type fuel strainer assemblies on the Diesel tractor should be disassembled and cleaned periodically to prevent the excessive accumulation of dirt and water. To do this proceed as follows:

1. Close the valve in the fuel strainer assembly under the fuel tank.
2. Loosen the retaining nut and swing the bail from under the glass bowl.
3. Remove the bowl with a twisting motion to avoid damaging the gasket.
4. Remove the gasket.
5. Remove the fuel strainer screen or edge type fuel strainer.
6. Rinse the screen or edge type fuel strainer in a cleaning solvent. Loosen, but do not remove, the screws in the edge type fuel strainer before the cleaning operation. Tighten the screws finger tight before reinstalling the strainer.
7. Install the screen or edge type fuel strainer in the fuel strainer assembly.

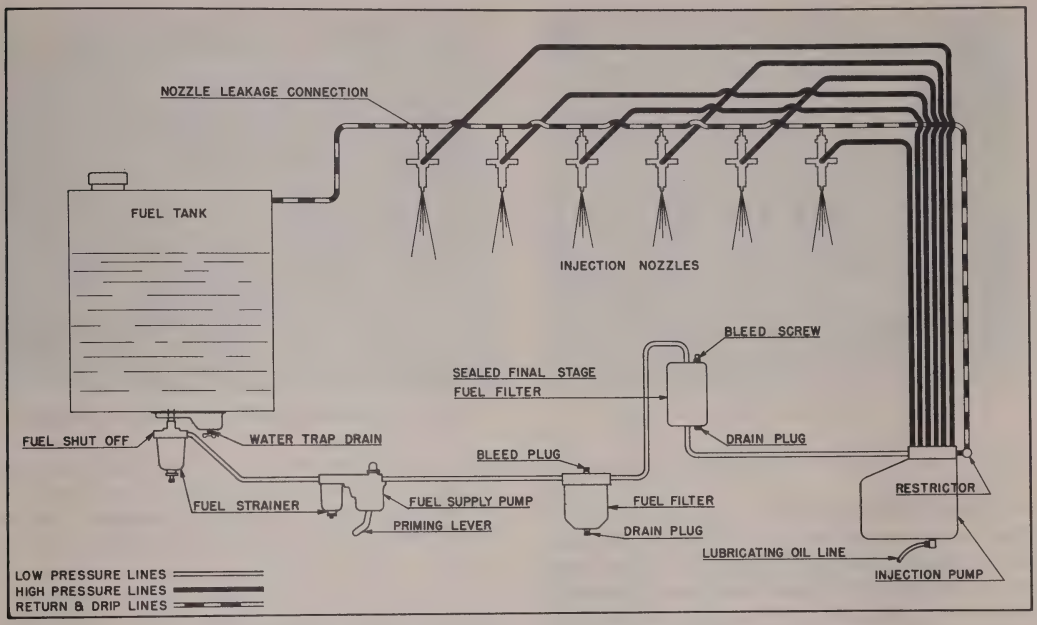


Figure 3-10 Diesel Fuel System Schematic Diagram

8. Install the gasket.
9. Install the glass bowl.
10. Install the bail with nut under the bowl and tighten the nut on HC tractors. On Diesel tractors, do not immediately tighten the nut. Allow it to remain loose so that air can escape when the fuel valve is opened.
11. Open the fuel valve in the body of the fuel strainer assembly.
12. Tighten the bail nut on the Diesel engine after fuel begins to overflow around the glass bowl.
13. Bleed the Diesel fuel system as outlined under Fuel System Bleeding.

DIESEL FUEL SYSTEM

The Diesel engine fuel system is different from the HC engine because it utilizes the principle of solid injection and compression ignition instead of carburetion and spark ignition. (See Figure 3-10.)

The following headings in this section outline the service and maintenance required by the operator for the Diesel fuel system. For information on the air cleaner and fuel strainer assemblies, refer to these headings under HC Fuel System.

WATER TRAP

The Diesel engine fuel system contains a water trap at the base of the fuel tank. This trap is provided with a drain cock for periodic removal of dirt and water accumulations. (See Figure 3-9.) Drain the water trap every evening after stopping the tractor and before filling the fuel tank.

DIESEL ENGINE GOVERNOR

The Diesel engine governor, which is an integral part of the fuel injection pump, is provided with two adjustments, the idle speed adjustment and the high no-load speed adjustment. (See Figure 3-11.)

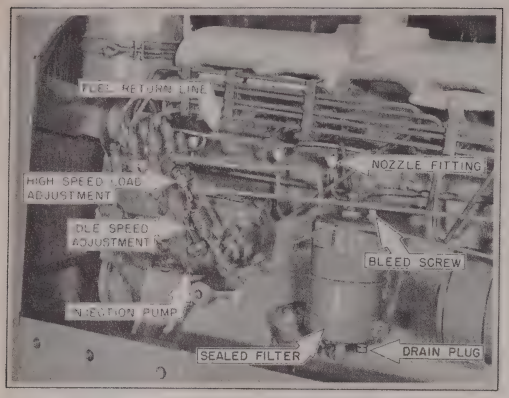


Figure 3-11 Left Side Of Diesel Engine

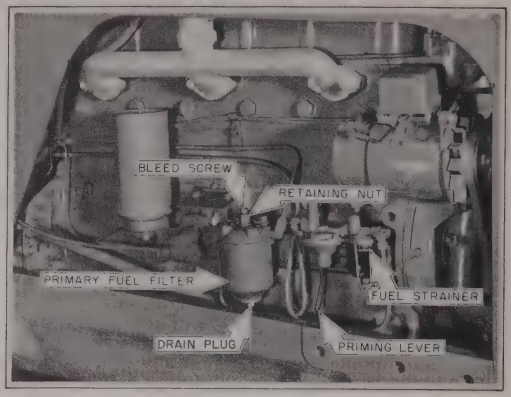


Figure 3-12 Primary Fuel Filter And Fuel Supply Pump

IDLE SPEED ADJUSTMENT

The idle speed of the Diesel engine is 650 - 700 revolutions per minute. To adjust the idle speed, start the engine and allow it to warm up to operating temperature. Place the governor control lever at the top of the governor control quadrant and check the engine revolutions per minute as registered on the tachourmeter. Loosen the lock nut on the idle adjusting screw and turn the screw in or out of the fixed boss on the side of the fuel injection pump to decrease or increase the engine idle speed. (See Figure 3-11.) Continue this adjustment until the correct speed of 650 - 700 revolutions per minute is registered on the tachourmeter and then tighten the lock nut on the adjusting screw to maintain the correct adjustment.

HIGH NO-LOAD SPEED ADJUSTMENT

The high no-load speed of the Diesel engine is 1750 revolutions per minute. To make the high no-load speed adjustment, start the engine and allow it to warm up to operating temperature. Place the governor control lever at the bottom of the governor control quadrant and check the engine revolutions per minute as registered on the tachourmeter. Loosen the lower nut on the spring adjusting screw and turn the top nut clockwise or counterclockwise to increase or decrease the engine speed. (See Figure 3-11.) Recheck the revolutions per minute on the tachourmeter and continue the adjustment until the correct speed of 1750 revolutions per minute is obtained. Tighten the lower nut after the adjustment is completed.

DIESEL FUEL FILTERS

Oliver Super 77 and 88 Diesel engines are equipped with two fuel filters. The first or primary filter, which contains a replaceable filter cartridge, is attached to the right-hand side of the engine. (See Figure 3-12.) The second or final stage fuel filter assembly, which is sealed, is installed on the left-hand side of the engine just behind the fuel injection pump. (See Figure 3-11.)

SERVICING REPLACEABLE CARTRIDGE FUEL FILTER

Change the fuel filtering cartridge, part number 1LA-5351, in the primary fuel filter on the right side of the engine every 750 hours of tractor operation or once a year whichever comes first. If the tractor is operated in extremely dusty and dirty conditions or if dirt or moisture is present in the fuel, it will be necessary to change the fuel filtering cartridge more often. To replace the cartridge in the primary filter, proceed as follows:

1. Turn off the fuel at the fuel tank.

2. Clean away all dirt from around the filter head and body.

3. Drain the fuel from the filter by removing the drain plug.
4. Loosen the body retaining screw and remove the filter body and cartridge.
5. Remove and discard the old fuel filtering cartridge from the filter body.
6. Clean the filter body, spring, retaining washer and cartridge bottom gasket by washing the complete assembly in clean Diesel fuel.
7. Inspect the cartridge bottom gasket on the center tube of the filter body to make certain that it is not damaged and will seal effectively. Replace this gasket if necessary.
8. Install the new fuel filtering cartridge in the filter body so that the end marked *Top* is nearest the opening of the body.
9. Inspect the fuel filter body and top cartridge gasket in the filter head. If either of these gaskets are hardened, stretched or otherwise damaged so that it does not provide a smooth sealing surface, it should be replaced. Also see that the cartridge top gasket is properly positioned in its recess in the filter head. This gasket may be coated with a clean heavy grease to hold it in place while the filter is being assembled.
10. Place the filter body in position and secure it to the filter head with the body retaining screw, being careful not to disturb or damage the cartridge top gasket or fuel filter body gasket in the head.
11. Reinstall the drain plug.
12. Turn on the fuel at the fuel tank.
13. Bleed the low pressure side of the fuel system as outlined under Fuel System Bleeding.

SERVICING SEALED FINAL STAGE FUEL FILTER

The sealed final stage fuel filter behind the fuel injection pump is the second in the series of two fuel filter assemblies. (See Figure 3-11.) For this reason, it does not require servicing as often as the replaceable cartridge type.

This filter must be replaced in its entirety every 2000 hours of tractor operation with a new assembly, part number 90910. It is recommended that this replacement be performed by your Oliver serviceman in the Dealer's service shop.

For the most satisfactory service life of this filter during the 2000 hours of tractor operation, remove the drain plug from the bottom and allow the filter to completely drain each time the cartridge is changed in the primary filter.

After draining the final stage fuel filter assembly, it will be necessary to bleed the air from the unit as outlined under Fuel System Bleeding.

FUEL SUPPLY PUMP

The camshaft driven fuel supply pump, which includes the edge type fuel strainer assembly, on the Diesel engine is attached to the right-hand side of the engine block. (See Figure 3-12.) The function of this pump is to force fuel, that is gravity fed from the fuel tank, through the fuel filters and to the fuel injection pump.

The fuel supply pump is equipped with a priming lever for bleeding the low pressure side of the fuel system and for checking the operation of the pump. To check the pump, turn the engine slowly, if necessary, until the camshaft releases the pump diaphragm so that it may be operated with the pump priming lever. Disconnect the fuel discharge line from the pump and operate the lever up and down. If fuel flows in strong spurts, the pump is satisfactory. If little or no fuel flows, the pump should be repaired or replaced.

FUEL SYSTEM BLEEDING

The purpose of bleeding the Diesel fuel system is to remove the air from the fuel lines. A small amount of air in the lines will prevent the transmission of sufficient pressure to force the fuel through the lines because the air will compress and expand. Air will be drawn into the fuel system whenever the fuel tank is empty, the fuel filtering elements or fuel strainer assemblies are serviced or the fuel lines are disconnected.

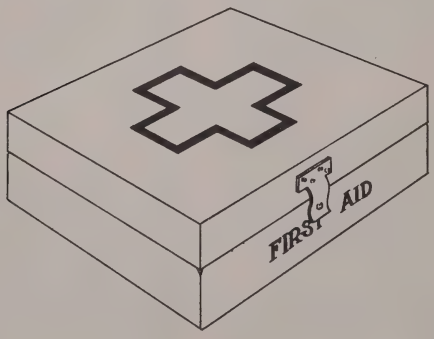
The Diesel engine fuel system is divided into two parts. The low pressure side, which is from the fuel tank through the injection pump, and the high pressure side, which is from the injection pump through the injection nozzles in the engine cylinders. (See Figures 3-10 and 3-11.)

To bleed the low pressure side of the fuel system, each filter must be bled separately and in sequence as outlined in the following steps.

1. Loosen the bleed screws in the top of both fuel filters.
2. Actuate by hand the priming lever on the fuel supply pump to force the fuel from the tank through the replaceable cartridge type filter. If the fuel supply pump priming lever fails to operate the fuel pump, turn the engine until the engine camshaft releases the pump diaphragm.
3. Pump fuel from the tank into the primary filter until clean fuel that is free of air bubbles flows out from around the bleed screw on the filter.
4. Tighten the bleed screw on the top of the primary filter.
5. Continue to pump fuel with the priming lever until clean fuel that is free of air bubbles flows from around the bleed screw on the secondary or sealed final stage fuel filter.
6. Tighten the bleed screw in the secondary fuel filter.
7. Operate the fuel supply pump priming lever an additional 20 strokes to clear the remainder of the low pressure side of the fuel system of trapped air.

After bleeding the low pressure side and before bleeding the high pressure side of the fuel system attempt to start the engine. If the engine fails to start or runs unevenly, air is probably trapped in the high pressure side. To bleed the air from this side of the system, proceed as follows:

1. Loosen all fuel line fittings at the nozzles to allow air and fuel to escape.
2. Push the fuel stop in and place the governor control lever at the bottom of the quadrant, turn the engine with the starting motor until clear fuel that is free of air bubbles escapes around the loosened fittings.
3. Tighten the fittings at the nozzles and start the engine.



KEEP A FIRST AID KIT CLOSE AT HAND IN CASE OF EMERGENCY

MILITARY TRACTOR

GENERAL

The function of the ignition and electrical system on the Military tractor, is identical to that on the regular tractor. The Military tractor, however, has two 12-volt batteries connected in series to provide a 24-volt potential. With the increase of electrical and ignition system voltage, the capacity of many other parts, such as the generator, starting motor, coil and light bulbs also has to be increased. In addition to the 24-volt capacity, the electrical system is installed so that it has a negative ground instead of the positive ground used on the regular tractor.

BATTERIES

Military tractors are equipped with two 12-volt batteries connected in series to supply a 24-volt potential for the ignition and electrical systems. The procedure for servicing these batteries is the same as for all other wet type batteries, but they are installed with the negative side of the right-hand battery grounded and the positive pole on the left-hand battery connected to the starter switch.

SECTION IV

IGNITION AND ELECTRICAL SYSTEM

GENERAL

The ignition system on Super 77 and 88 HC tractors consists primarily of a battery, ignition starter switch, coil, distributor, condenser, spark plugs and connecting leads. These parts are required on an HC tractor to provide a means for igniting the fuel-air mixture in the combustion chambers. The Super 77 and 88 Diesel tractor, which has a compression ignition engine, does not require an electrical ignition system for starting combustion in the engine cylinders.

The 12-volt, positive ground electrical system on the HC and Diesel tractors includes the battery, light switch, fuse, lights, generator, current-voltage regulator, ammeter, connecting leads, fused leads for the Hydra-Lectric Control and solenoid actuated starting motor.

WIRING DIAGRAMS

Schematic wiring diagrams for both HC and Diesel tractors are shown in Figures 4-1 and 4-2. These diagrams indicate the wiring of tractors equipped with a two cylinder Hydra-Lectric Control. Where the tractor is not equipped with the Hydra-Lectric Control, that part of the diagram may be disregarded.

BATTERY

Oliver Super 77 and 88 HC tractors are equipped with one, automotive type, 70 ampere hour battery. This battery is installed on a battery mounting support behind the instrument panel. Super 77 and 88 Diesel tractors are equipped with two, automotive type, 130 ampere hour batteries mounted on a support which is also behind the instrument panel. These two batteries are connected in series to supply a 12-volt potential for starting the engine and operating the air preheater and the other electrical circuits. (See Figure 4-3.)

BATTERY REGISTRATION CERTIFICATE

A battery registration certificate is furnished with your tractor by the battery manufacturer. Your Oliver Dealer will fill out this certificate, explain the warranty on the battery and present the certificate to you upon delivery of your tractor. He will also inform you of the location of your nearest authorized battery service station so that you will know whom to contact should the battery require servicing. In the event of premature failure, present the certificate to the battery serviceman when requesting an adjustment.

BATTERY SERVICING

Check the liquid in the battery cells weekly or every 60 hours of tractor operation. Maintain this liquid or electrolyte 1/4 to 3/8 inch above the battery plates or even with the level indicator where provided. When the electrolyte is low or below the plates, add distilled water with a syringe to avoid overfilling. Ordinary spring or well water is not recommended for refilling battery cells because it may contain mineral impurities that will seriously impair battery action and cause severe damage.

To remove or check the battery or batteries from the HC or Diesel tractor remove the four screws, two in each side of the hood, and remove the small section of the hood. Remove the cables from battery terminals and remove the clamp. The battery or batteries are then free to be lifted from the tractor. (See Figure 4-3.)

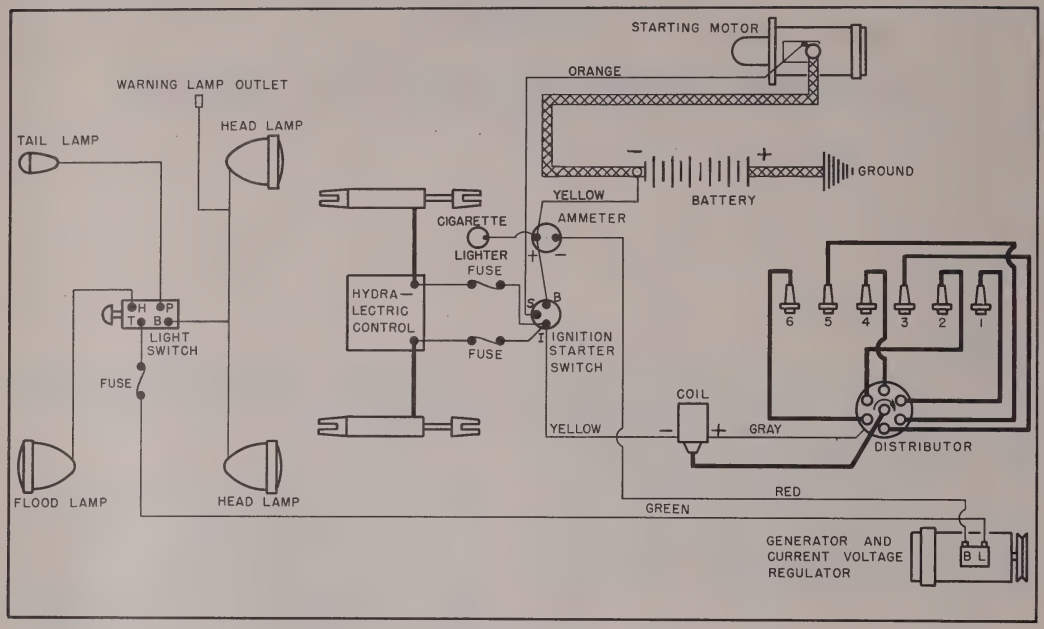


Figure 4-1 HC Schematic Wiring Diagram

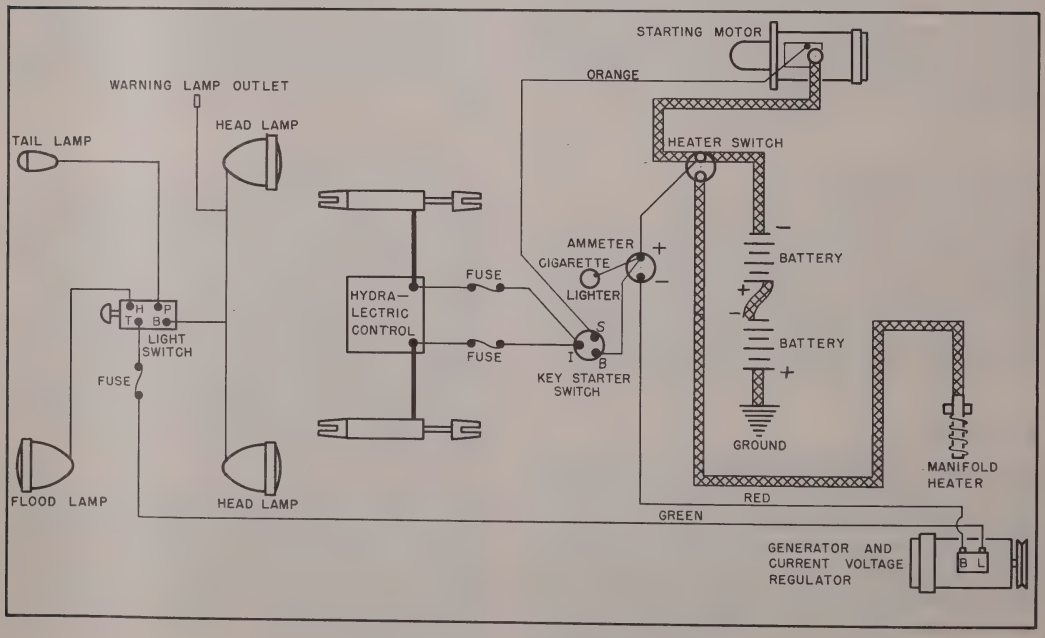


Figure 4-2 Diesel Schematic Wiring Diagram

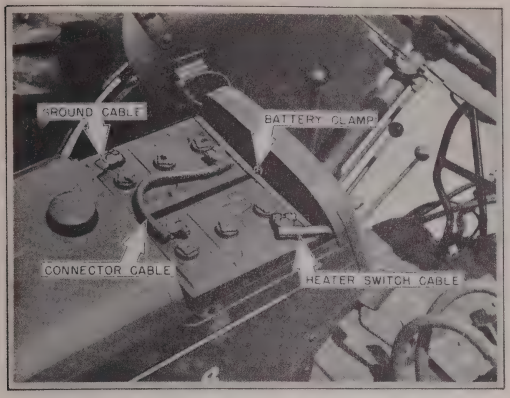


Figure 4-3 Batteries Installed In Diesel Tractor

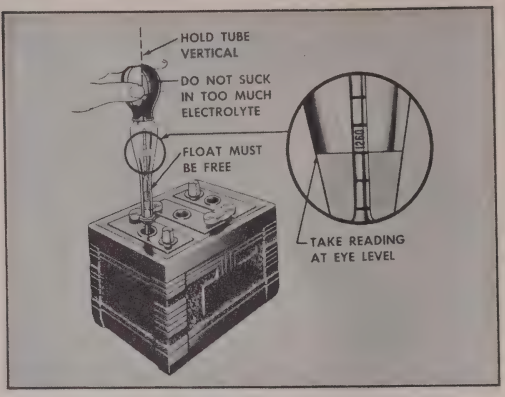


Figure 4-4 Testing Battery Electrolyte With Hydrometer

When installing a battery in an HC tractor, connect the negative terminal to the starter and then attach the ground cable to the positive terminal of the battery. Installing the battery in this manner prevents accidental short circuits caused by tools striking metal objects.

When installing the batteries in a Diesel tractor, fasten the connector cable to the negative terminal of the right-hand battery and to the positive terminal of the left-hand battery. (See Figure 4-3.) Do not allow the cable to bind on the terminals as this will impose a strain on the batteries. Connect the negative terminal of the left-hand battery to the air preheater switch and then ground the positive terminal of the right-hand battery.

The cables must be tight on the battery terminals so that a good contact area can be maintained. If broken strands or defective insulation is detected on a cable, it should be replaced. Always use a puller to remove corroded cable clamps from the battery terminal. Never pry on the clamps with a screw driver or strike the terminals with a hammer. Clean corroded clamps with a wire brush and coat the terminals with petroleum jelly to retard further corrosion.

Check the specific gravity of the battery electrolyte with a hydrometer every 30 days to determine the condition of the battery. (See Figure 4-4.) The following table will serve as a guide for interpreting the specific gravity readings.

1.265 — 1.290	Fully charged
1.235 — 1.260	Three-fourths charged
1.205 — 1.230	One-half charged
1.140 — 1.165	Barely operative
1.110 — 1.135	Completely discharged

Readings below 1.250 indicate that the battery should be recharged.

The electrolyte in the battery cells should not be checked with a hydrometer immediately after distilled water has been added as an incorrect reading will be obtained. Operate the tractor for at least two hours before attempting to take a reading.

COIL

The ignition coil requires no periodic servicing, but it may be necessary to replace it during the life of the tractor. (See Figure 4-11.) When installing a new coil, connect the negative terminal to the wire leading to the ignition switch and attach the positive terminal to the wire leading to the distributor. The coil terminals are marked with a small plus and minus sign to identify the terminals.

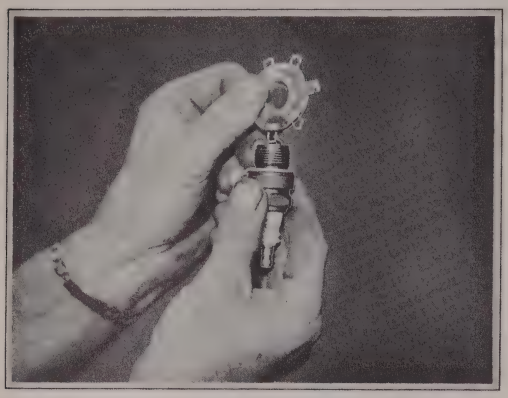


Figure 4-5 Checking Spark Plug Gap

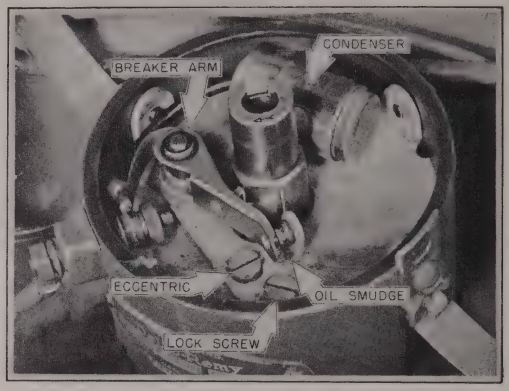


Figure 4-6 Distributor With Cap Removed

SPARK PLUGS

Spark plugs require periodic servicing because they become worn, dirty and broken. For these reasons, it is advisable to remove, clean, inspect and adjust the spark plugs monthly or every 250 hours of tractor operation. Remove the spark plugs and gaskets, after first cleaning away all dirt from around the plugs and recesses, by turning the plugs in a counter-clockwise direction with a 7/8 inch spark plug wrench. Clean the plugs with a fine steel wire brush or a sand blast cleaner and check them for eroded or burned electrodes and cracked or broken insulators. Replace all plugs showing these defects. Reface the electrodes of the serviceable plugs with a flat point file and then use a round wire feeler gauge to adjust the spark gap to .025 inch on all the plugs to be installed in the engine. (See Figure 4-5.) Always adjust the spark gap by bending the ground or side electrode. Bending the center electrode will result in damage to the plug. Clean the spark plug threads with a wire brush before installing new gaskets. The proper procedure for installing the plugs in the engine is to turn them in tight with your fingers and then turn them in an additional 1/2 to 3/4 turn with a wrench to compress the gaskets. If new gaskets are unavailable and the old gaskets must be used, turn the plugs in an additional 1/4 turn only. When using a torque wrench, turn the plugs in with a torque value of 34 foot pounds.

The following chart lists the recommended 18 mm, 7/8 inch hexagonal spark plugs to be used in Super 77 and 88 Series HC tractor engines.

Manufacturer	Heavy Duty Service	Normal Duty Service	Light Duty Service
A.C.	83-S Com.	85-S Com.	87-S Com.
Auto-Lite	BT-4	BT-8	BT-8
Champion	6 Com.	8 Com.	8 Com.

DISTRIBUTOR

The function of a distributor on a spark ignition engine is to open and close the primary circuit so that a high voltage can be induced in the secondary circuit, deliver a high tension spark to the individual cylinders at the correct instant, and automatically advance and retard the ignition timing according to the speed of the engine.

INSPECTION

Under normal operating conditions, the distributor will operate several hundred hours before requiring any servicing; however, it is advisable to inspect it periodically to make certain that all parts are in operating condition. Before inspecting the distributor, clean away all dirt from the distributor and cap. Remove the distributor cap and clean it inside and out with a dry, lint-free cloth. Inspect the cap and distributor rotor for chips and cracks. Check the breaker points to see if they are burned, pitted or dirty. (See Figure 4-6.) Dirty points may be cleaned with a point file, but burned and pitted points must be replaced and the cause of damage discovered and remedied. Difficulty with burned or pitted points can usually be corrected by replacing a faulty coil

SPARK PLUGS

The Military tractor is equipped with six K-E-6 commercial, shield resister type spark plugs. The ignition wires, which are also shielded, are attached to the distributor cover and the spark plugs with 5/8 - 24 threaded connectors.

DISTRIBUTOR

The procedure for inspecting and adjusting the Delco-Remy distributor is similar to that outlined in this Operator's Manual. The ignition coil, however, is an integral part of the distributor and the complete assembly is covered by a metallic shield.

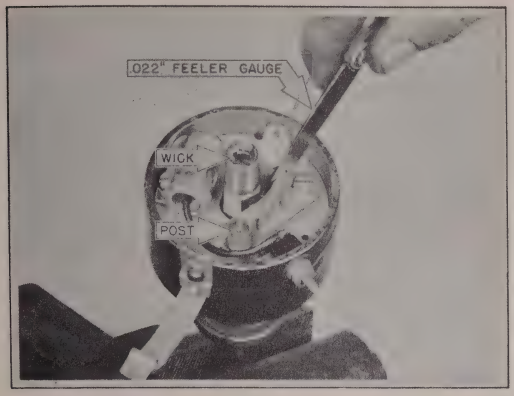


Figure 4-7 Distributor Point Adjustment

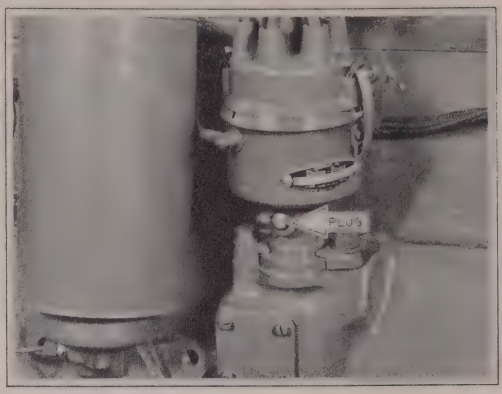


Figure 4-8 Distributor Lubrication Plug

or condenser. If the cause of burning or pitting is not remedied, the new points will immediately begin to wear and give very unsatisfactory service.

DISTRIBUTOR POINTS

REMOVAL

Remove the distributor cap, rotor and distributor housing cover. Loosen the nut on the primary terminal so that the slotted breaker arm spring may be removed with the breaker arm and point. (See Figure 4-6.) Remove the lock screw and lift the stationary point and support from the distributor housing. To install breaker points, reverse the above procedure.

DISTRIBUTOR POINT ADJUSTMENT

Turn the engine with a crank until the breaker cam follower is resting on the top of one of the breaker cam lobes. Loosen the lock screw and turn the eccentric with a screw driver to change the distance between the two points. Adjust the point gap opening to .022 inch by turning the eccentric and measuring the point opening with a feeler gauge. (See Figure 4-7.) Lock the point opening at .022 inch by tightening the lock screw. Always check the point opening after tightening the lock screw.

LUBRICATION

Twice each year, oil the breaker cam felt wick and the breaker arm post with two or three drops of SAE 10W engine oil and apply a light coat of petroleum jelly to the breaker cam. (See Figure 4-7.) Every 500 hours of tractor operation, remove the pipe plug from the base of the distributor housing and fill the reservoir with SAE 20W engine oil. (See Figure 4-8.)

Avoid excessive lubrication. If too much oil is used on the breaker cam post or felt wick, the oil may come in contact with the distributor points, causing them to burn.

TIMING THE IGNITION

Before timing the ignition, be sure the distributor point opening is correct and the points are not burned, pitted or dirty.

Remove the cover from the timing hole in the right-hand side of the flywheel housing. Remove the spark plug from the number one cylinder. With your thumb over the spark plug hole, turn the engine slowly until air pressure is felt against your thumb. This means that the piston is coming up on the compression stroke. Continue turning the engine until the top-dead-center (TDC) mark on the flywheel is in line with the notch in the timing hole in the flywheel housing. Remove the distributor cap, rotor and dust cover. Loosen the distributor clamp cap screws and rotate the distributor counterclockwise until the points open. Insert a cigarette paper or a piece of cellophane between the points and rotate the distributor clockwise until the points close on the paper.

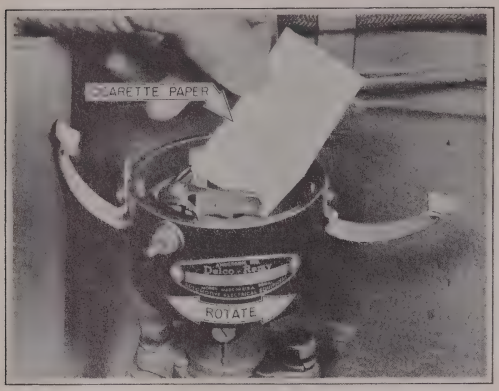


Figure 4-9 Timing Ignition With Cigarette Paper

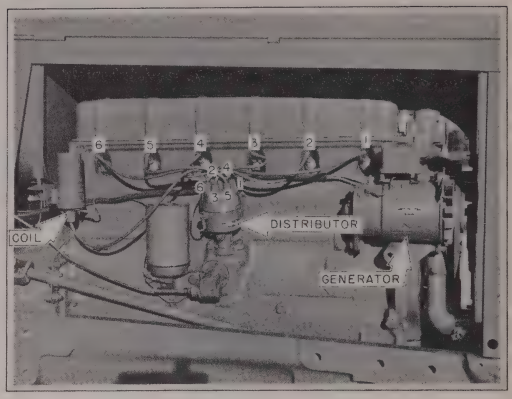


Figure 4-11 HC Ignition System

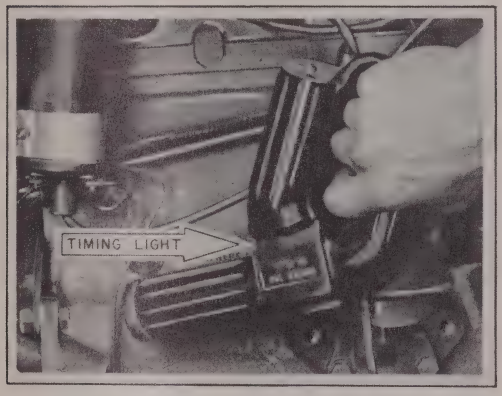


Figure 4-10 Timing Ignition With Timing Light

Then very slowly rotate the distributor counterclockwise until the paper can just be pulled from between the points. (See Figure 4-9.) Tighten the distributor clamp cap screws, check the breaker point opening and be sure there are no particles of paper or cellophane between the points. Install the dust cover and rotor. Note the position of the rotor. The rotor in this position will be pointing at the number one terminal inside the distributor cap when the cap is installed. Install the distributor cap. If the spark plug wires have been removed from the distributor cap, install the wires with the wire from the number one spark plug in the distributor cap terminal that is directly over the rotor. Continue installing the wires in a clockwise direction around the cap according to the 1-5-3-6-2-4 engine firing order. Install the spark plug and wire. Install the timing hole cover on the flywheel housing.

A more accurate and satisfactory adjustment of the ignition timing may be obtained by using a timing light. To do this, remove the timing hole cover from the flywheel housing and turn the engine until the *IGN/HC* mark on the flywheel is centered in the hole. To make the mark on the flywheel more clearly visible, use white paint or chalk to make a circle about 1/2 to 3/4 inch in diameter over the *IGN/HC* mark, and draw a line through the center of the circle with a pencil. Install the timing light as recommended by the manufacturer or use the spark plug lead from the number one cylinder to time the engine. Start the engine and run it at high no-load speed (1750 rpm). Hold the timing light or spark plug lead close to the engine flywheel. (See Figure 4-10.) If the pencil mark does not line up with the notch in the hole of the housing as the light or spark flashes, loosen the distributor clamp cap screws and rotate the distributor until the mark is correctly aligned. After the correct timing is obtained, clamp the distributor in position, turn off the engine, remove the timing light or reinstall the spark plug lead and reinstall the timing hole cover. (See Figure 4-11.)

MILITARY TRACTOR

GENERATOR

The 24-volt Delco-Remy generator is similar in appearance to the regular tractor generator. The primary difference of the Military tractor generator is that it has a higher capacity. Also the voltage regulator is mounted in the clutch compartment under the fuel tank instead of being attached to the generator. The voltage regulator is connected to the generator on the Military tractor by a wire that is enclosed in a shielded flexible cable. The bearings are packed and sealed at the factory which eliminates periodic lubrication attention.

STARTING MOTOR

The 24-volt starting motor operates on the same principle as the 12-volt starting motor on the regular tractor. This 24-volt motor differs from the 12-volt type in that the bearings are packed and sealed at the factory which eliminates periodic lubrication attention.

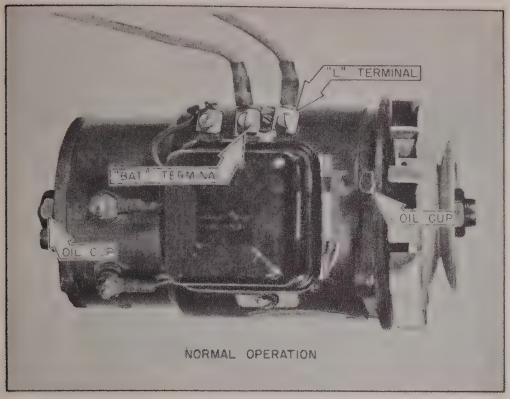


Figure 4-12 Regulator Wired For Normal Operation

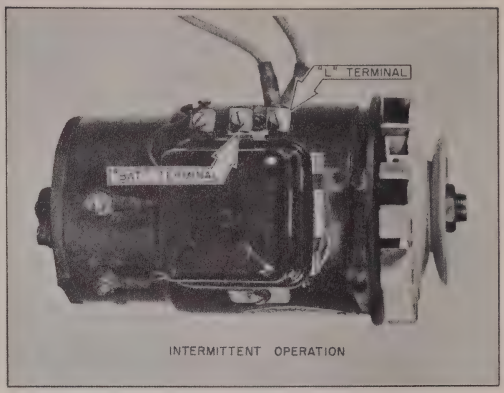


Figure 4-13 Regulator Wired For Intermittent Operation

GENERATOR

The generator on Oliver Super 77 and 88 tractors is an air cooled, two brush generator that is equipped with an automatic current-voltage regulator and a cutout relay. The purpose of the generator is to provide a source of electrical energy to maintain the storage battery or batteries in a charged condition and to recharge them when they become discharged. The generator also supplies sufficient current to meet the requirements of the lights, ignition system and Hydra-Lectric Control.

The generator is driven by the fan belt. The adjustment of this belt is outlined under Fan Belt Adjustment in Section V.

Servicing the generator, combination current-voltage regulator and cutout relay requires special tools and equipment. For these reasons, it is recommended that you consult your Oliver serviceman if trouble is experienced with any of these units.

NOTE

THE VOLTAGE REGULATOR IS MOUNTED ON RUBBER TO REDUCE VIBRATION. WHEN REMOVING OR INSTALLING THE GENERATOR, DO NOT USE THE REGULATOR AS A HANDLE BECUASE DAMAGE TO THE MOUNTING AND CONNECTIONS MAY RESULT.

During cold weather when the tractor is used intermittently for short periods, the battery or batteries may slowly become discharged because the generator is not operated long enough to completely replace the current withdrawn for starting purposes. Where this condition exists, it is permissible to increase the generator charging rate by removing the wire attached to the *BAT* terminal of the regulator and connecting it to the *L* terminal. (See Figures 4-12 and 4-13.) However, be sure to reinstall the wire on the *BAT* terminal to avoid overcharging and damaging the battery or batteries when the tractor is again used for long hours of operation.

LUBRICATION

The generator bearings should be lubricated with a few drops of SAE 20 engine oil weekly or every 60 hours of tractor operation. Do not overlubricate. Five or six drops of SAE 20 engine oil in each of the hinge cap oilers is sufficient. (See Figure 4-12.)

STARTING MOTOR

The 12-volt starting motor on Super 77 and 88 HC engines is equipped with a Bendix drive that automatically engages and disengages the starting motor drive pinion with the ring gear on the flywheel. To avoid damaging the drive pinion, never turn on the starter switch when the engine is running and be sure to release the switch when the engine starts.

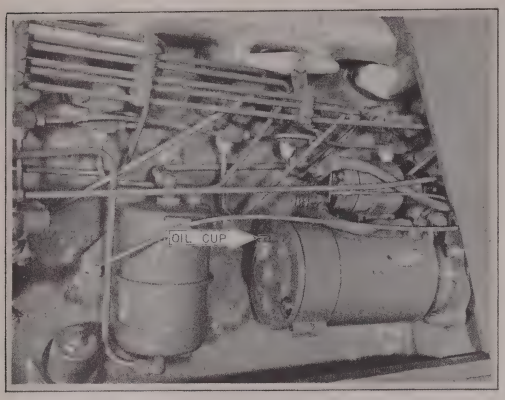


Figure 4-14 Diesel Starting Motor Lubrication

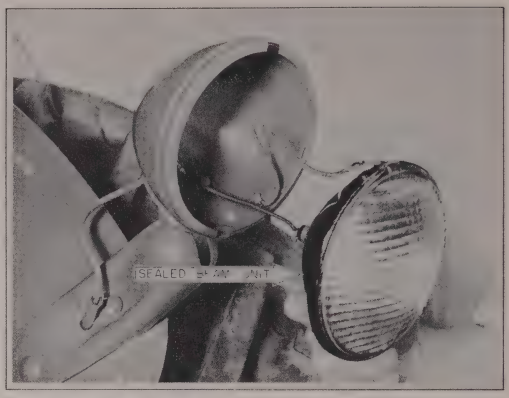


Figure 4-15 Removing Sealed Beam Lamp

The starting motor on the Super 77 and 88 Diesel engine is a 12-volt unit designed to turn the engine against the heavier loads imposed by the higher compression ratio. This starting motor is provided with an overrunning clutch mechanism that provides positive engagement and disengagement of the drive pinion with the flywheel ring gear. By using this type of starting motor design on the Diesel engine, the operator may keep the starting motor engaged until the engine has started and continues to run.

Starting motors require a large amount of current when they are turning the tractor engine. Consequently they become overheated in a very short time. For best starting performance, it is recommended that each attempt should not exceed 30 seconds without pausing for a short time when several attempts are required before the engine will start.

Servicing starting motors requires special tools and equipment. Therefore where difficulty is experienced with the performance of these units, consult your Oliver serviceman.

LUBRICATION

The starting motor on the Super 77 and 88 Diesel tractor is provided with a hinge cap oiler on the front of the unit for lubricating the front bearing. (See Figure 4-14.) Lubricate this bearing with six to eight drops of SAE 20 engine oil monthly or every 250 hours of tractor operation.

The front bearing in the HC engine starting motor is sealed at the factory and requires no additional periodic lubrication.

LIGHTS AND FUSE

The two head lamps and the rear flood lamp on the Super 77 and 88 HC and Diesel tractors are equipped with sealed beam lighting unit. The tail light is a single contact, bayonet type bulb. They are all 12—16 volt capacity.

If the lights fail to operate, inspect the fuse in the main light wire inside the battery compartment. If the fuse is burned out, check the electrical wiring for a short circuit before installing a new 20 ampere fuse. Where only one light fails to operate, check the bulb or sealed lighting unit for a burned out element.

When replacing a sealed beam light unit in a head or flood lamp, it is necessary to loosen the screw in the lens holder and remove the holder from the lamp. (See Figure 4-15.) Remove the sealed lighting unit and remove the screw fastening the black wire to the base of the lamp. Then remove the screw attaching the white ground wire to the unit. Install a new sealed beam assembly by reversing the above procedure.

LIGHTS AND FUSES

The two fungus treated head lights and rear flood light are equipped with 24-volt, 40 candle power, single contact, flange type bulbs. The fungus treated tail light is equipped with 6 candle power, single contact, bayonet type bulb.

To replace a bulb in a head or flood light remove the screw in the lens holder and remove the lens holder and the lens. Remove the bulb from the socket by turning it in a counterclockwise direction. To replace the tail light bulb, remove the screw from the lens holder and remove the holder and the lens. Remove the bulb by pressing in and turning it in a counterclockwise direction. Install new bulbs by reversing the above procedure.

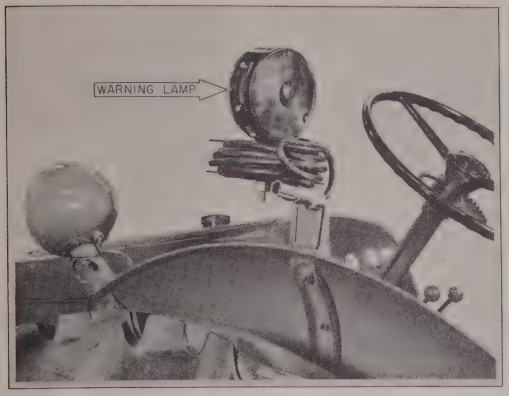


Figure 4-16 Warning Lamp

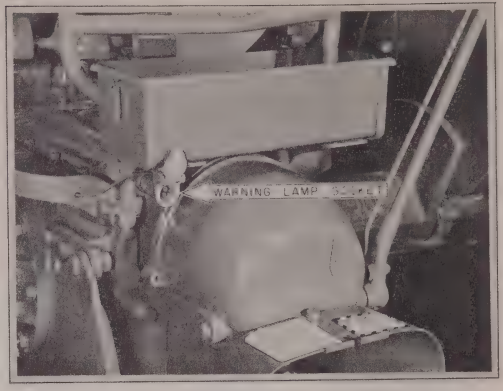


Figure 4-17 Warning Lamp Socket

When installing a sealed beam lighting unit in the right-hand head lamp, place it in the lamp body so that the word and letters *TOP/RH* on the lens are in the uppermost position. Similarly, when installing a new unit in the left-hand head lamp, fasten it in the body so that the word and letters *TOP/LH* are in the uppermost position. The sealed beam lighting unit is normally installed in the rear flood lamp with the word and letters *TOP/LH* at the top, but it may be installed in either position depending upon the light pattern required and the area behind the tractor that requires the greatest illumination.

To remove the tail lamp bulb, remove the screw in the lens holder and remove the holder and lens from the lamp body. Remove the bulb by pushing it in and turning it counterclockwise to disengage the bayonet lugs. To install new tail lamp bulbs, reverse this procedure.

WARNING LAMP

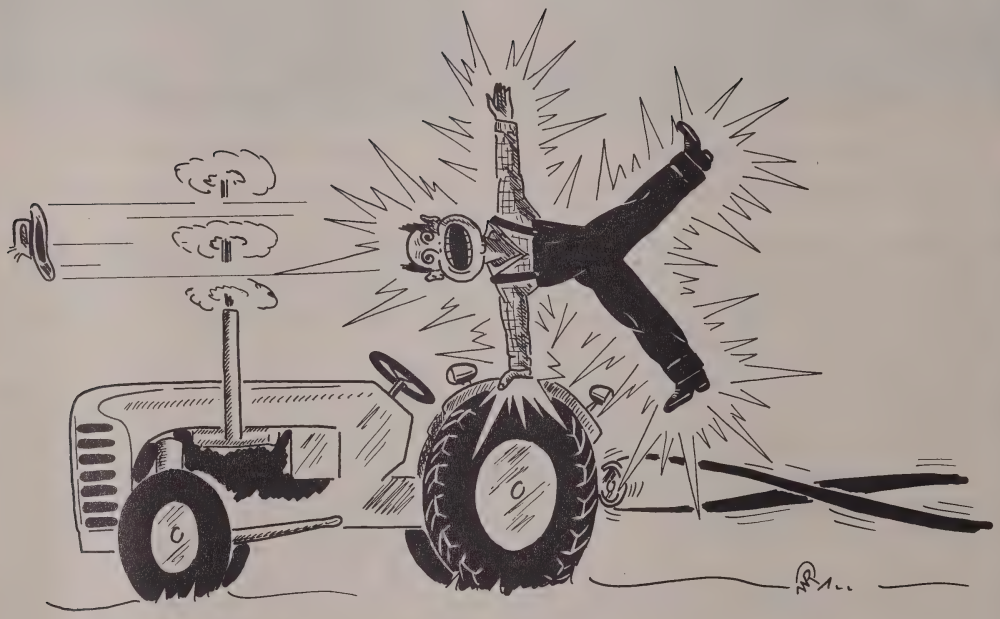
A warning lamp is available as optional equipment. (See Figure 4-16.) This warning lamp is a two-way device with an amber lens in the front and a red lens in the rear for providing additional safety to the operator and tractor against oncoming or overtaking vehicles when traveling on roads or highways.

The warning lamp is installed in a bracket on the left wheel guard of the tractor. All tractors equipped with electric lights have an electrical socket for the warning lamp connector installed on the under side of the tool box. (See Figure 4-17.) This socket is an integral part of the light wiring system and current is available whenever the head lamps are turned on. The warning lamp is provided with a 22 foot electrical cable so that the lamp can be removed from its bracket on the tractor wheel guard and placed in a similar bracket installed on mounted or drawn implements.

The warning lamp socket can be used with other auxiliary electrical equipment of the same voltage when desired.

NEVER OPERATE A TRACTOR ON A ROAD OR HIGHWAY AT NIGHT

WITHOUT A WARNING LAMP



ALWAYS PROPERLY GROUND TRACTOR WHEN DOING BELT WORK

SECTION V

COOLING SYSTEM

GENERAL

The cooling system on Oliver Super 77 and 88 Series tractors is equipped with a pressure type radiator and a four pound pressure cap. Always loosen radiator cap approximately 1/4 turn to release pressure before removing cap completely from the tractor.

The function of the cooling system is twofold: maintaining correct engine operating temperature and dissipating surplus engine heat resulting from the combustion of the fuel in the cylinders. Neither function is secondary in importance; overheating is as harmful as overcooling. For this reason, it is necessary that the temperature of the cooling system be maintained within the limits of the green *Work* range on the temperature gauge.

The bypass type cooling system on the Oliver Super 77 and 88 Series tractors is equipped with a thermostat in the water outlet housing at the forward end of the cylinder head. This thermostat bypasses the cooling liquid through the cylinder block water jacket until the engine nears operating temperature. When the engine approaches operating temperature, the thermostat opens sealing off the bypass and allowing the coolant to circulate through the radiator. (See Figure 5-1.) It is imperative that the thermostat be in the cooling system at all times. Removing it in warm weather will allow the cooling liquid to circulate through the water jacket only and overheating will occur.

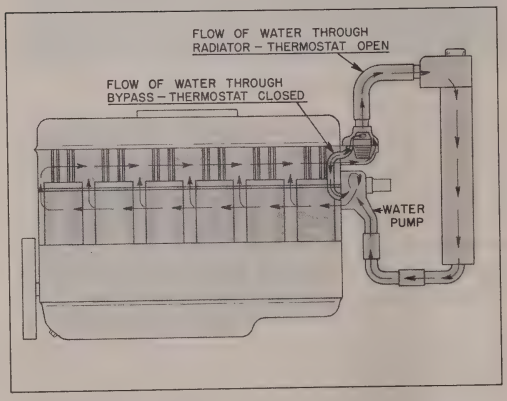


Figure 5-1 Cooling System Schematic Diagram

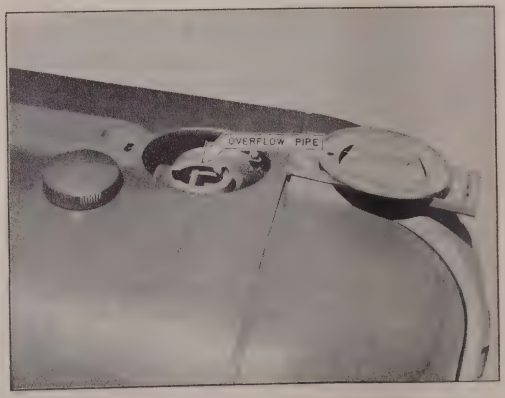


Figure 5-2 Radiator Cap Removed

COOLING SYSTEM SERVICING

Check the level of the liquid in the radiator daily and maintain it 1-1/2 inches below the top of the radiator overflow pipe. (See Figure 5-2.)

Soft water should always be used in the cooling system of your tractor engine except when the water is replaced with a suitable anti-freeze. One-half pint of water soluble oil or other commercial rust inhibiter

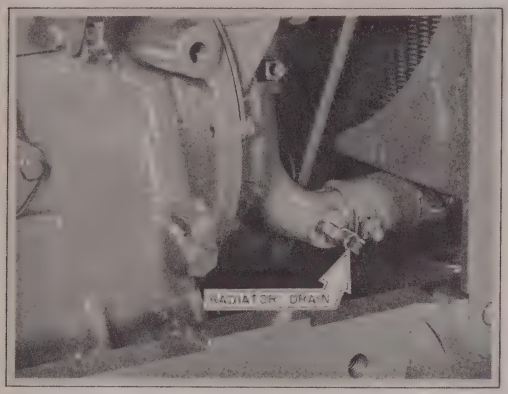


Figure 5-3 Radiator Drain

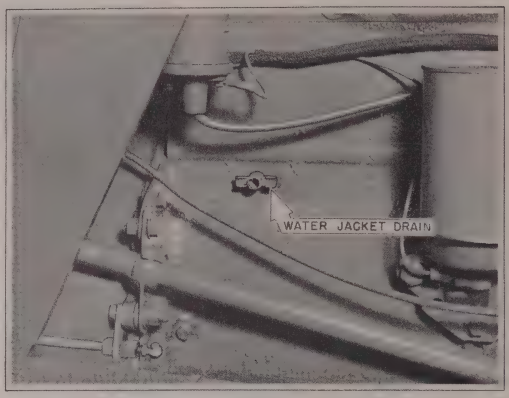


Figure 5-4 Water Jacket Drain

should be added to the water in the system to prevent the formation of rust. If the cooling system is filled with a permanent type anti-freeze solution, it is not necessary to add a rust inhibiter because anti-freeze purchased from a reliable dealer and made by a reputable company contains a rust preventive.

The cooling system should be drained and flushed with clean soft water twice a year. Spring and fall are the ideal times for this draining and flushing operation. Install new radiator hoses in the fall when the system is flushed prior to the installation of a permanent type anti-freeze.

Recommended anti-freeze solutions for your tractor are those solutions containing ethylene glycol in one of its forms. Prestone is an example of a permanent type anti-freeze that is suitable for winter operation in your tractor cooling system. The use of alcohol is not recommended as a winter coolant because the high operating temperature of the tractor engine will cause it to vaporize out of the system.

The practice of using water and draining it at the end of each work day throughout the cold season is not recommended. However, if a suitable anti-freeze is not available, catch the water that is drained each evening and use it again the following day. This will prevent the addition of mineral impurities to the cooling system and the loss of the soluble oil in the original water.

Open both drains when draining the cooling system. To open the drains, turn them in a counterclockwise direction. One drain is in the lower radiator hose fitting and the other is in the engine block on the right-hand side of the tractor. (See Figures 5-3 and 5-4.)

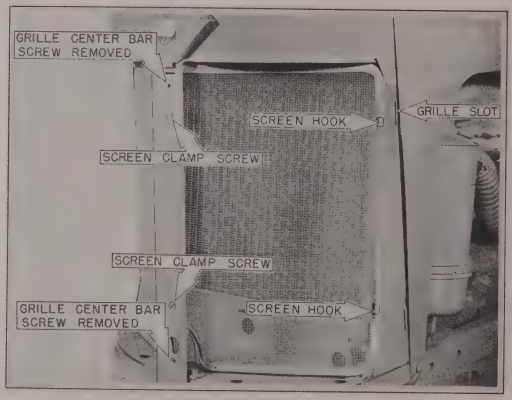


Figure 5-5 Radiator Screen

RADIATOR SCREEN

A radiator screen is provided as standard equipment to reduce the possibility of the radiator fins becoming clogged with chaff, leaves, insects or other foreign material. (See Figure 5-5.) When inspection reveals that the screen requires cleaning, the radiator grilles can be quickly removed, permitting easy access to the screen. To remove the grille, remove the two screws holding the grille center bar to the radiator shell and remove the bar. Swing the two grilles back and the screen will be fully exposed for cleaning purposes.

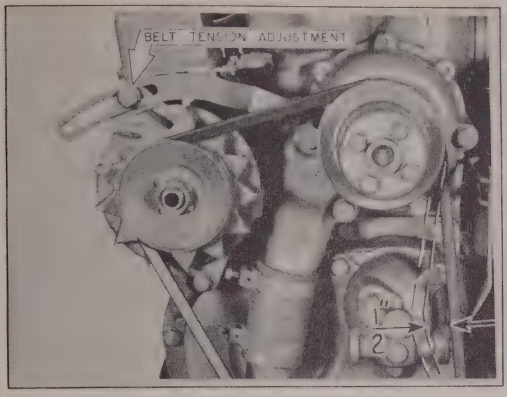


Figure 5-6 Fan And Generator Belt Tension Adjustment

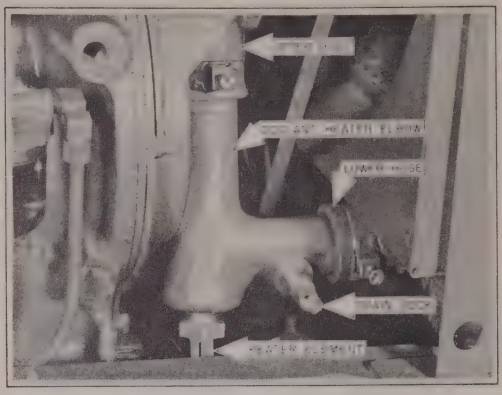


Figure 5-7 Coolant Heater

FAN BELT

ADJUSTMENT

NOTE

FAN BELT ADJUSTMENT SHOULD BE CHECKED AFTER THE FIRST TEN HOURS OF TRACTOR OPERATION AND READJUSTED AS REQUIRED.

To adjust the tension of the fan and generator belt, loosen the generator mounting bolts and the generator belt tension strap bolt. Pull the generator against the belt until there is 1/2 inch slack in the belt. (See Figure 5-6.) Tighten the generator mounting bolts and belt tension strap bolt to maintain the fan belt adjustment.

The fan belt on tractors equipped with a power steering unit must be kept tight. Check the belt tension daily for the first ten days of operation and adjust as necessary. Adjust the belt so that it is tight with not more than 1/4 inch slack. A loose fan belt will have a tendency to slip and squeal on the drive pulleys. This will be particularly noticeable when the steering wheel is turned to the extreme right or left against the stops causing the relief valve to blow.

If the belt is tightened too tight, it will fail prematurely.

REPLACEMENT

When replacing the fan belt, precautions must be taken so that the belt is not stretched. If the belt is stretched, adjustment of the belt tension by repositioning the generator may not be adequate. To replace the fan belt, proceed as follows:

1. Loosen the generator mounting bolts and belt tension strap bolt.
2. Push the generator toward the engine to loosen the belt.
3. Remove the belt from the generator pulley, water pump pulley and the fan drive pulley.
4. Install the new fan belt on the generator and water pump pulleys. Then install it on the crankshaft fan drive pulley. Installing the belt in this manner will aid considerably in its installation. If this sequence is not followed, damage to the belt may result during the installation.
5. Tighten the fan belt as outlined under Fan Belt Adjustment.

KEEP FAN BELT TIGHT ON TRACTORS WITH POWER STEERING

COOLANT HEATER

There is available from your Oliver Dealer an electrical coolant heater kit that may be installed as an integral part of the engine water inlet elbow. It is a 1000 watt emersion type heater and is equipped with a standard electrical three prong connector. It can be connected to any regular 110-volt current outlet. (See Figure 5-7.)

In cold weather, approximately two hours of operation should be sufficient to warm the coolant in the engine. However, in extremely cold weather it may be necessary to leave it connected for longer periods of time. This will mean a great saving on your batteries when starting your tractor in cold weather.

NEVER DISMOUNT FROM THE TRACTOR WHILE IT IS IN MOTION

SECTION VI

CLUTCH

GENERAL

Oliver Super 77 and 88 tractors are equipped with a single plate, dry disc, spring loaded engine clutch assembly. This type of clutch mechanism is used on all Super Series tractors, but the size is different. Super 77 tractors are provided with a clutch that is 10 inches in diameter and the Super 88 tractors are equipped with a clutch that is 11 inches in diameter.

The tractor platform or bull gear cover acts as a stop for the engaged and disengaged positions of the clutch pedal. Therefore, if the platform becomes bent, the engine clutch may not operate satisfactorily and it cannot be adjusted properly. For these reasons, always straighten the platform whenever it has become damaged.

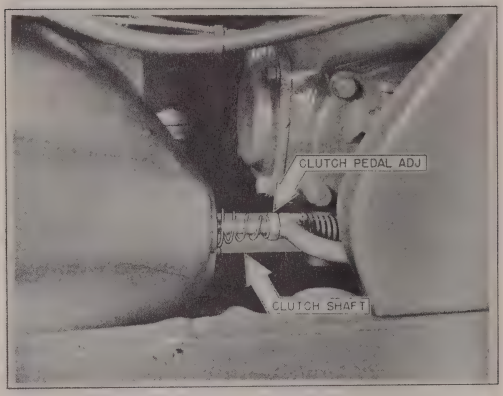


Figure 6-1 Clutch Pedal Adjustment

CLUTCH ADJUSTMENT

The engine clutch assembly, which is properly adjusted on a new tractor, allows the clutch pedal several inches of free travel. When this clutch pedal free travel is decreased through wear to 3/4 to 1 inch, the engine clutch will require additional adjustment. Clutch pedal free travel is the distance the pedal may be moved from its upper limit downward to the point where resistance is encountered. When this resistance on the pedal is detected, the engine clutch assembly begins to disengage the engine from the transmission. As the facings on the clutch driven plate wear, the pressure plate is required to travel farther toward the engine flywheel, which reduces the clutch pedal free travel.

The clutch pedal is adjusted by varying the length of the clutch release rod attached to the clutch pedal and extending into the clutch housing. The adjustment is on the clutch release rod end immediately outside the clutch housing. To make the adjustment, remove the hood side panel and clutch compartment door on the left side of the tractor. Loosen the lock nut on the clutch release rod end and turn the rod to increase or decrease its length as required. (See Figure 6-1.) To compensate for wear of the clutch driven plate, it is necessary to shorten the clutch release rod by turning the release rod end into the release rod. Turn the rod end two or three turns and then check for the correct adjustment by depressing the clutch pedal and attempting to turn the clutch shaft when the tractor transmission is in a neutral position. If the clutch assembly releases the clutch shaft when the stop on the under side of the clutch pedal is approximately one inch from the tractor platform, the clutch is properly adjusted. (See Figure 6-2.) If the clutch adjustment is not correct, continue adjusting the length of the clutch release rod until the proper adjustment is obtained. Then tighten the release rod end lock nut and reinstall the clutch compartment door and hood side panel.

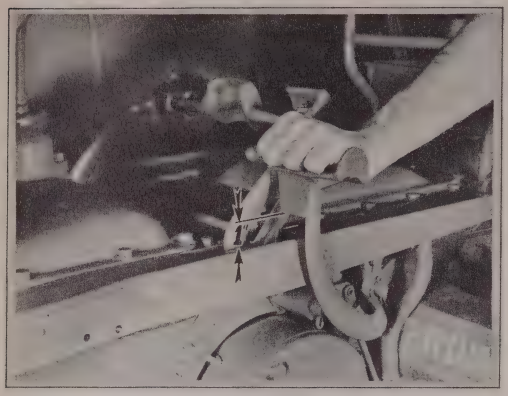


Figure 6-2 Checking Clutch Pedal Adjustment

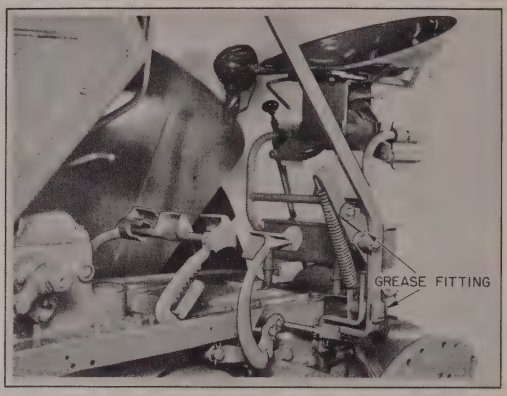


Figure 6-4 Clutch Hand Control

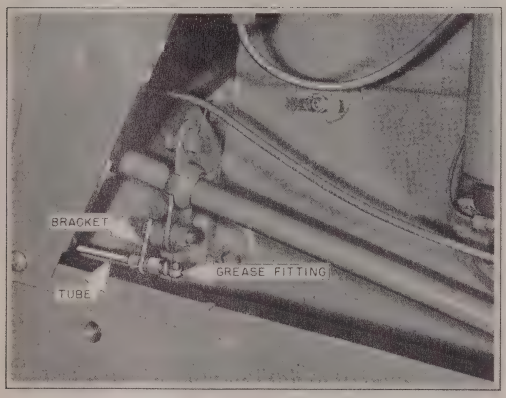


Figure 6-3 Clutch Release Bearing Lubrication

LUBRICATION

The clutch release bearing is provided with an external grease fitting which provides a means for periodic lubrication. (See Figure 6-3.) Service this grease fitting daily or every ten hours of tractor operation. Do not overgrease because the excess lubricant may work its way onto the clutch facings, causing them to slip and chatter. One stroke with the grease gun daily is sufficient lubrication for this clutch release bearing.

A clutch hand control may be installed as optional equipment on all models of the Super 77 and 88 tractor. (See Figure 6-4.) This control does not change any of the clutch adjustments, but manual lubrication of the clutch hand control is required daily for ease of operation when your tractor is equipped with this mechanism.

NEVER ENGAGE THE CLUTCH UNLESS IT IS POSSIBLE TO

DISENGAGE IT IMMEDIATELY

SECTION VII

TRANSMISSION, DIFFERENTIAL, BRAKES AND FINAL DRIVE

GENERAL

The transmission, differential and parts of the final drive are enclosed within the rear main frame of the tractor. These parts are adjusted at the factory and do not require any further adjustments between major overhauls.

Individual, self-energizing, double disc steering brakes are mounted on the sides of the rear main frame. These brakes control the rear wheels indirectly by exerting their braking action on the differential bull pinions. The entire brake assemblies are covered to prevent oil, dirt, water and snow from contacting and damaging the brake disc linings.

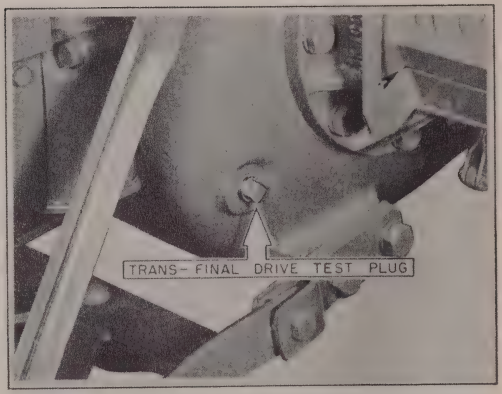


Figure 7-1 Transmission And Final Drive Test Plug

LUBRICATION

The transmission, differential and final drive assemblies are lubricated by a common oil supply contained within the rear main frame, which eliminates individual lubrication attention. Some of the oil runs into the belt pulley housing lubricating the belt pulley mechanism.

The transmission, differential and final drive must be kept properly lubricated at all times to withstand the severe stresses imposed upon them. For this reason, it is recommended that the lubricating oil be checked at least once a month or every 250 hours of tractor operation. The test plug for checking the oil level is in the differential housing behind the right rear axle carrier. (See Figure 7-1.) Remove the test plug and if the oil is more than one inch below the hole, add a sufficient quantity of seasonal grade transmission lubricant to raise the oil level to within 1/2 inch of the lower edge of the test plug hole.

The oil levels of the transmission and final drive compartments of the rear main frame are different. When the tractor is performing drawbar work, the oil in the transmission is kept at the correct level by the pumping action of the final drive gears. During stationary work, oil from the transmission compartment slowly drains back into the final drive compartment, leaving the transmission and belt pulley assembly without adequate lubrication. To ensure sufficient transmission and belt pulley lubrication for long periods, always set the tractor on level ground or with the front wheels lower than the rear when performing belt work.

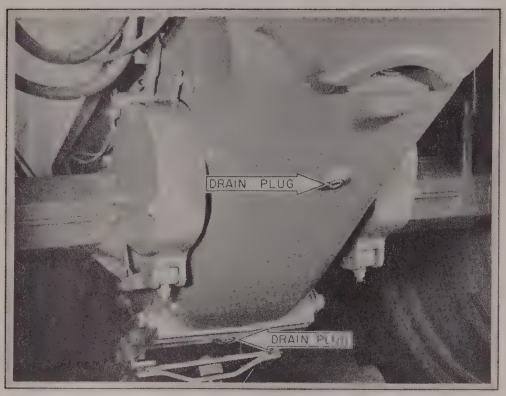


Figure 7-2 Transmission And Final Drive Drain Plugs

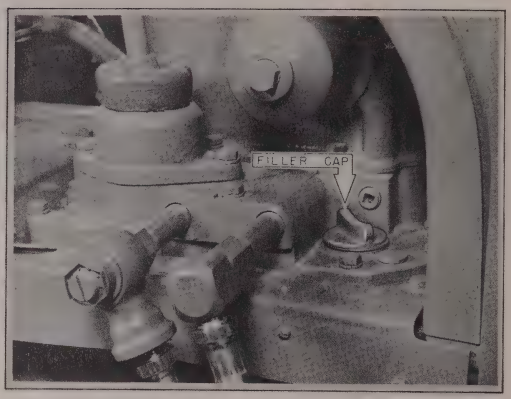


Figure 7-4 Filler Cap With Hydraulic System Installed

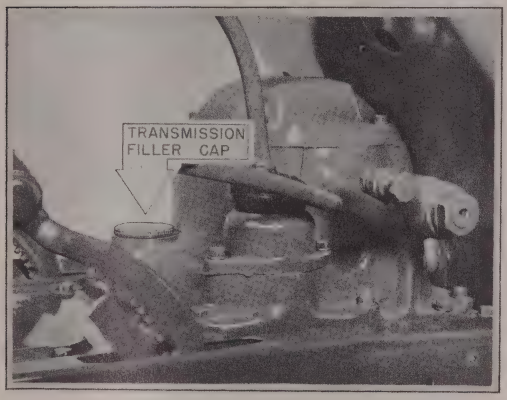


Figure 7-3 Filler Cap With Power Lift Installed

NOTE

IF THE TRACTOR IS USED FOR 60 OR 70 HOURS OF CONTINUOUS BELT WORK, DRAIN ONE GALLON OF OIL FROM THE FINAL DRIVE COMPARTMENT AND POUR IT INTO THE TRANSMISSION FILLER CAP OPENING. ADDITION OF NEW OIL TO MAINTAIN THE CORRECT TRANSMISSION LEVEL IS NOT REQUIRED.

Drain the transmission and final drive compartments every spring and fall by removing the two drain plugs from the bottom of the rear main frame. (See Figure 7-2.) Install the plugs and flush the transmission, differential and final drive. To do this, pour three or four gallons of kerosene into the transmission filler cap opening and operate the tractor in all transmission gears without load for five minutes. Remove the two drain plugs and remove the flushing solvent from the rear main frame. Reinstall the drain plugs and refill the transmission and final drive compartments with 4-1/2 gallons of seasonal grade transmission oil. (See Figures 7-3 and 7-4.)

GEAR SHIFT

The gear shift positions are unique because there are two neutral positions of the gear shift lever as shown on the diagram plates. (See Figure 7-5.) Two springs inside the gear shift lever socket return the lever to the neutral position when it is released from any of the travel speeds. When the lever is in either the front or rear neutral position, there is free side movement of the lever. Some resistance is felt on the lever when shifting from one neutral area to the other because this movement shifts one of the gears in the transmission.

To shift the transmission into any gear speed, move the gear shift lever from either neutral position to the desired gear speed position as shown on the diagram plate.

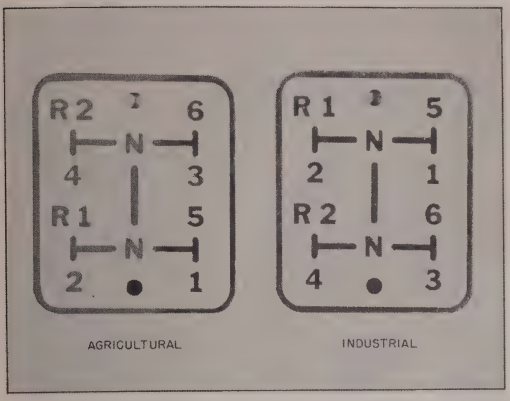


Figure 7-5 Gear Shift Diagram Plates

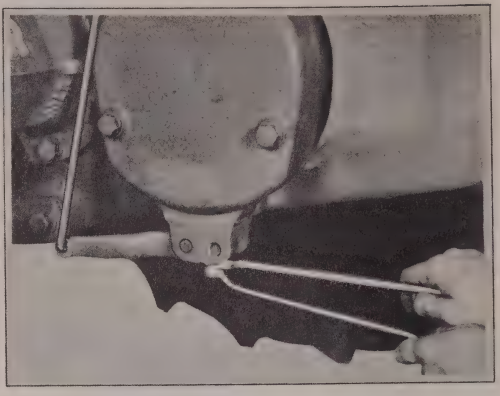


Figure 7-7 Adjusting Disc Brakes

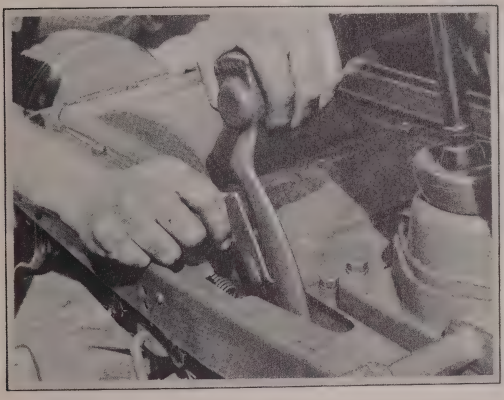


Figure 7-6 Checking Brake Pedal Adjustments

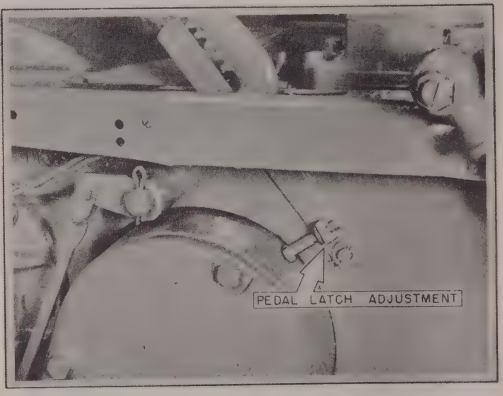


Figure 7-8 Pedal Lock Latch Adjustment

BRAKE PEDAL ADJUSTMENT

The brakes are properly adjusted when the lock latch enters the third or fourth notch from the bottom when the pedal is depressed by hand. (See Figure 7-6.)

To adjust the brakes, loosen the lock nut on the actuating rod and turn the adjusting nut. (See Figure 7-7.) The actuating rod has a right-hand thread so that turning the adjusting nut clockwise tightens the brakes. If the brake pedals require additional free travel, turn the nut to the left. Continue turning the adjusting nut to the right or left, as required, until the correct adjustment is obtained. Then tighten the lock nut against the adjusting nut to maintain the brake adjustment.

The brake pedal lock latches on Oliver Super 77 and 88 tractors are adjustable so that the brake pedals may be easily locked in position. To adjust the latch, loosen the lock nut on the latch adjusting cap screw and turn the screw until the offset in the latch just clears the serrations on the pedal. (See Figure 7-8.) Tighten the lock nut to keep the adjusting cap screw from turning.

During the operation of the tractor, the brakes will sometimes stick. This is usually caused by dust deposits on the brake linings and may be corrected by removing the brake housing cover and wiping the dust from the braking surfaces. If this does not correct the difficulty, consult your Oliver service man.

ALWAYS HITCH TO THE DRAWBAR AND NOT TO OTHER

PARTS OF THE TRACTOR

SECTION VIII

STEERING GEAR AND LINKAGE

GENERAL

Two different types of steering gears are used on the Oliver Super 77 and 88 Series tractors. The Row Crop dual and single front wheel tractors are equipped with an Oliver steering gear of the worm and sector type. Row Crop adjustable front axle, Standard and Industrial tractors use Saginaw steering gears that operate on the re-circulating ball principle.

Or, the tractor may be equipped with a power steering unit as optional equipment. This unit is installed in place of the Oliver or Saginaw steering gear.

The steering linkage consists of the steering wheel, steering shafts, bearings, bushings, steering column and universal joints. The Row Crop adjustable front axle, Standard and Industrial tractors, with their automotive type front ends, are equipped with tie rods that are also included in the steering linkage.

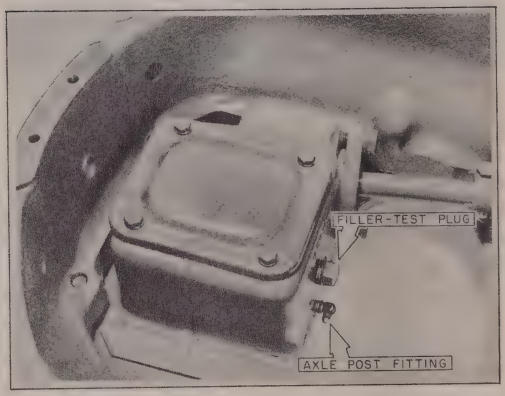


Figure 8-1 Oliver Steering Gear Filler-Test Plug

STEERING GEAR LUBRICATION

On all tractors that are equipped with the Oliver steering gear, the lubricant should be checked monthly or every 250 hours of tractor operation. The oil should be maintained level with the lower edge of the filler-test plug hole in the steering gear housing. (See Figure 8-1.) If the lubricant is below this level, add SAE 90 transmission gear lubricant. The capacity of the Row Crop dual wheel front end is 1/2 pint as compared to 3/4 pint for the Row Crop single wheel front end tractor.

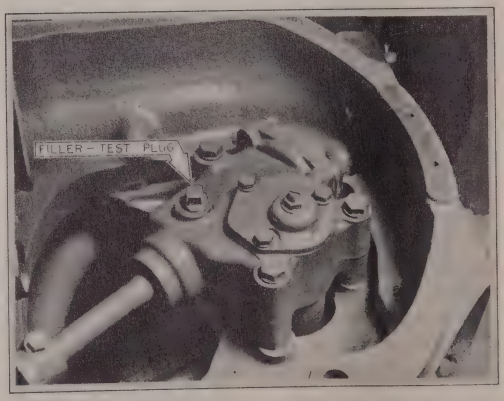


Figure 8-2 Saginaw Steering Gear Filler-Test Plug

The Saginaw steering gear installed on Row Crop adjustable front axle, Standard and Industrial tractors is shipped from the factory with one pound or pint of SAE 90 gear lubricant enclosed. This steering gear requires a minimum of lubrication attention, but if the oil level becomes low or the steering gear has been disassembled, add SAE 90 gear lubricant through the filler-test plug hole. (See Figure 8-2.) The oil level in the steering gear should be maintained at the lower edge of this hole.

The steering column and steering shaft bushings and bearings are made of sintered bronze that are saturated with a lubricant and require no additional

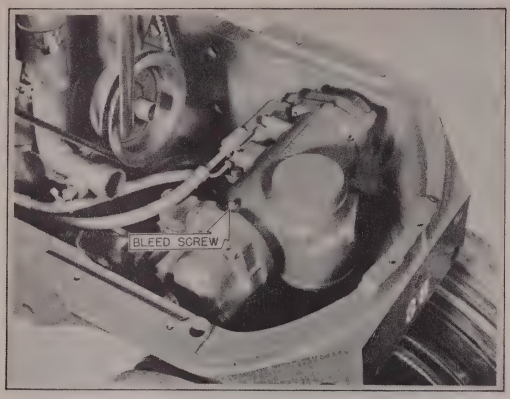


Figure 8-3 Power Steering Gear Bleed Screw

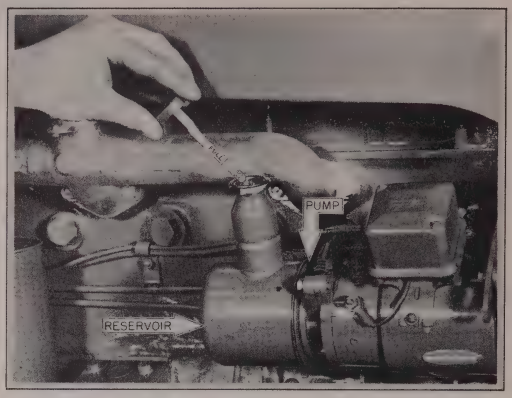


Figure 8-4 Checking Power Steering Reservoir Oil Level

lubrication attention. The tie rod ends on Row Crop adjustable front axle, Standard and Industrial tractors must be greased with pressure gun grease daily or every ten hours of tractor operation. Row Crop dual and single front wheel tractors are provided with a grease fitting below the steering gear housing pipe plug for daily lubrication of the front axle post. (See Figure 8-1.)

POWER STEERING

The Super 77 and 88 power steering assembly containing the hydraulic cylinder and steering gear is a self-contained unit mounted on the tractor front axle bolster. (See Figure 8-3.) The power steering pump and reservoir is mounted on the rear of the generator and is driven directly by the generator shaft. (See Figure 8-4.) Full hydraulic power is transmitted to the steering gear whenever the steering wheel is actuated.

The power steering assembly requires no service or adjustment other than checking the oil level, as outlined under Lubrication, and periodically bleeding air from the system should the need arise. Air in the power steering assembly will cause the unit to operate erratically and the front wheels to shimmy excessively.

Be sure to keep the fan belt tight as outlined in Section V. Should the unit fail to operate satisfactorily when it is full of oil and air is not trapped in the system, see your Oliver service man.

LUBRICATION

Approximately one quart of SAE 10W engine oil is required to completely fill the power steering control. Check the level of the oil within the reservoir daily by removing the bayonet gauge attached to the filler cap on the reservoir. (See Figure 8-4.) Add additional oil as required. Do not allow the oil level to get below the *ADD* mark on the bayonet gauge. If the oil level gets low, air will become trapped and it will be necessary to bleed the system as outlined under Bleeding System below.

BLEEDING SYSTEM

To bleed the system, fill the oil reservoir to the level of the *FULL* mark on the bayonet gauge. Start the tractor engine and turn the steering wheel to the extreme right until the relief valve blows. With the relief valve blowing, loosen the small bleed screw on the right-hand end of the power steering hydraulic cylinder and allow the oil to escape until it is free of air bubbles then tighten the screw. (See Figure 8-3.) Repeat the same procedure for the left-hand end of the cylinder by turning the steering wheel to the extreme left and while the relief valve is blowing, loosen the bleed screw on the right-hand end of the cylinder. Check the oil level in the reservoir and fill to the level of the *FULL* mark on the bayonet gauge.

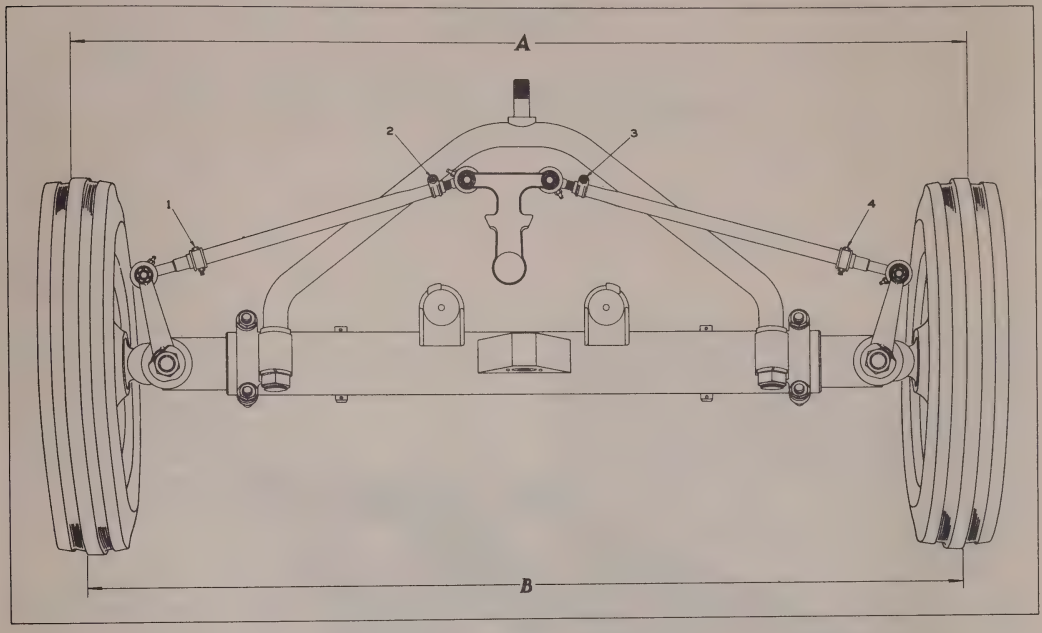


Figure 8-5 Toe-In Adjustment

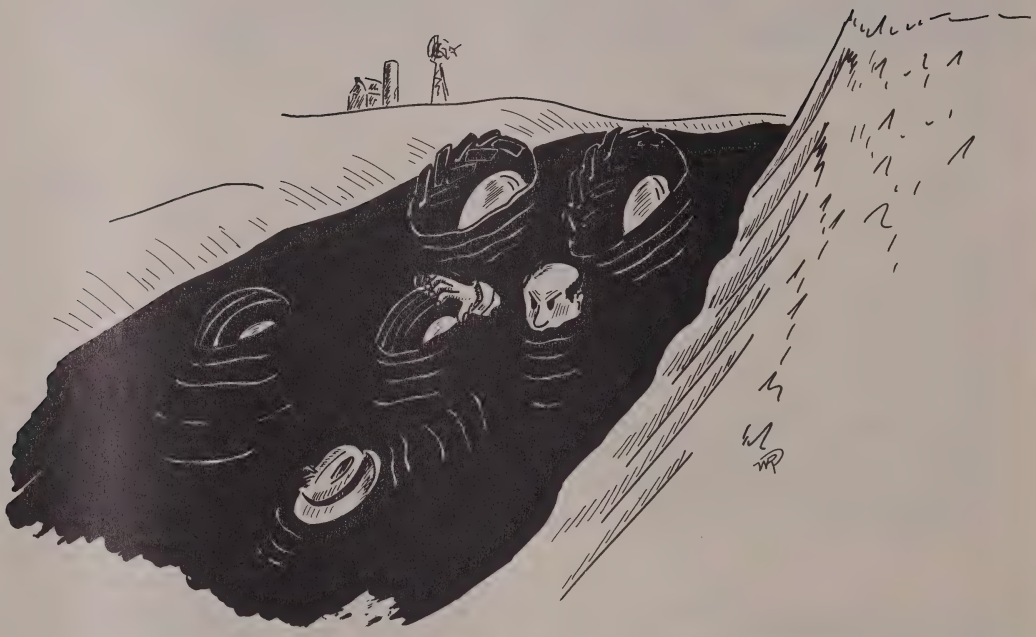
NOTE

USE EXTREME CAUTION WHEN BLEEDING THE SYSTEM TO BE SURE THAT YOUR HAND OR ARM DOES NOT BECOME INJURED BY THE FAN DRIVE PULLEY.

TOE-IN ADJUSTMENT

To check the toe-in adjustment of the Row Crop adjustable front axle tractor, turn the wheels to the straight ahead position and inflate the tires to the correct recommended air pressure. At hub height, measure the distance between the outside edges of the tire center ribs at the front (B) and the rear (A) sides. Rotate the wheels one-half turn and repeat the measurements. Determine the averages of the front and rear readings separately. The averages are taken to ensure that an improperly positioned rim will not affect the toe-in adjustment. The average distance between the outside edges of the center ribs at the front of the tires should be 3/16 inch less than the average distance between the outside edges of the center ribs at the rear of the tires. If any adjustment is necessary, loosen the inner clamp lock bolts (2 and 3 Figure 8-5.) and remove the outer clamp lock bolts (1 and 4 Figure 8-5.) on the ends of the tie rods. Turn the tie rods to increase or decrease the toe-in as required. The threaded ends of the tie rods and tie rod sockets have right and left-hand threads so that the adjustment may be made in this manner. Make equal adjustments on each tie rod and then install and tighten the clamp bolts before making a final check of the toe-in. Always check and adjust the toe-in after changing the front wheel tread setting on the Super 77 and 88 Row Crop adjustable front axle tractor.

To check and adjust the toe-in on the Super 77 and 88 Standard and Industrial tractors, follow the same general procedure as outlined above for the Row Crop tractor except it is not necessary to remove the tie rod outer clamp bolts. If these bolts are loosened in the same manner as the inner clamp bolts, the tie rods will be free to turn.



NEVER DRIVE TOO CLOSE TO A DITCH OR GULLY

SECTION IX

FRONT END EQUIPMENT

GENERAL

Row Crop tractors may be equipped with either a dual wheel, adjustable front axle or a single wheel type of front end. These different types of front end design are completely interchangeable on the front frame of the tractor because each is installed as a complete unit. Standard and Industrial tractors are provided with a front bolster and the conventional automotive type front end.

The adjustable front axle on the Row Crop tractor is fastened to the front axle carrier with a pivot pin. The front wheel tread of this Row Crop tractor may be quickly and easily adjusted by raising the front of the tractor off the ground, loosening the front axle clamp nuts, removing the tie rod outer clamp cap screws, removing the front axle lock pins and sliding the front axle outer members in or out of the center tube. (See Figure 9-1.) Front wheel tread adjustments may be increased or decreased in two inch increments by reinstalling the lock pins in alternate holes. Where the lock pins are installed in the same holes from which they were removed, the minimum distance that the front wheel tread can be changed is four inches. For a complete list of the front wheel tread settings on all Super 77 and 88 tractors, refer to the Specifications in Section I.

Adjusting the width of the front axle of a extra high clearance tractor is the same as the adjustable front axle except for the two turnbuckle braces. The turnbuckle braces should be adjusted each time to apply a small amount of pressure forward on the front members. (See Figure 9-2.)

The Row Crop single front wheel front end tractor may be equipped with either a ten or a sixteen inch diameter wheel. When sixteen inch wheels and tires are used, adapter blocks must be installed on the front wheel fork so that sufficient space can be provided for the larger diameter tire.

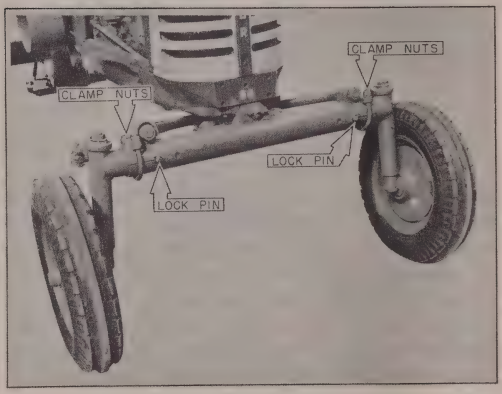


Figure 9-1 Adjustable Front Axle

Figure 9-2 Extra High Clearance Tractor Front Wheel Tread Adjustment

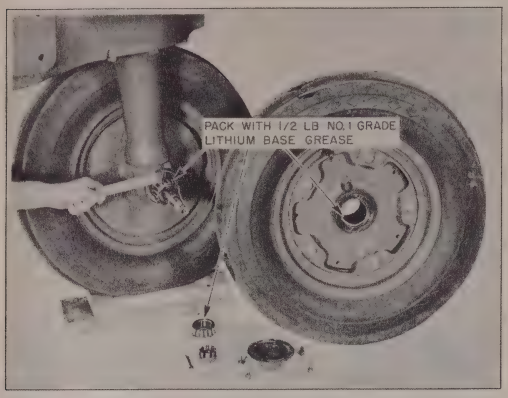


Figure 9-3 Packing Front Wheel Bearings

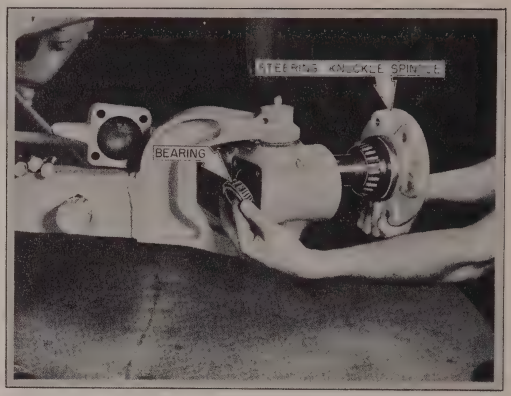


Figure 9-4 Removing Steering Knuckle Spindle

The front wheels on all the Super 77 and 88 Series tractor models are supported and turn on tapered roller bearings. These bearings are kept free of dirt by specially designed rubber seals. On the Row Crop tractors, the seals turn against a bearing seal wearing cup to prevent wear of the spindle flange. On Standard and Industrial tractors, the wearing cups turn against the seals, which remain stationary.

FRONT END LUBRICATION

The front axle pivot and steering knuckle pivots are provided with grease fittings. Lubricate the knuckle pivots daily and the axle pivot weekly with pressure gun grease.

FRONT WHEEL LUBRICATION

The front wheel hubs are lubricated with approximately one-half pound of multi-purpose No. 1 lithium or calcium base grease. Once each year or every 1000 hours of tractor operation, whichever occurs first, repack the wheels as follows:

1. Clean all dirt from the wheel hub.

2. Remove the hub cap, cotter pin and bearing nut. (See Figure 9-3.) Remove the wheel and outer bearing from the spindle as a unit. If the outer bearing cone sticks to the spindle, tap the wheel hub to loosen the cone. As the wheel is removed, prevent the outer bearing from falling to the floor or ground and support the wheel to prevent damaging the grease seal when the inner bearing slides off the inner bearing cone.

   On single front wheel models, remove the wheel from the fork assembly, screw the lock nut from the spindle and remove the bearings and spindle. (See Figure 9-6.)

   On Industrial models, remove the steering knuckle arm, cotter pin, nut, bearing and spindle. (See Figure 9-4.)

3. Wash all parts in a cleaning solvent to remove all hardened or dirty grease.

4. Thoroughly inspect the seals and the bearings for chips or nicks and replace all damaged or worn parts.

5. Apply a liberal coating of grease on the bearings and seals and assemble the wheel packing the hub with approximately one-half pound of multi-purpose No. 1 grade lithium or calcium base grease. (See Figure 9-3.)

6. Adjust the bearings as outlined under Wheel Bearing Adjustment.

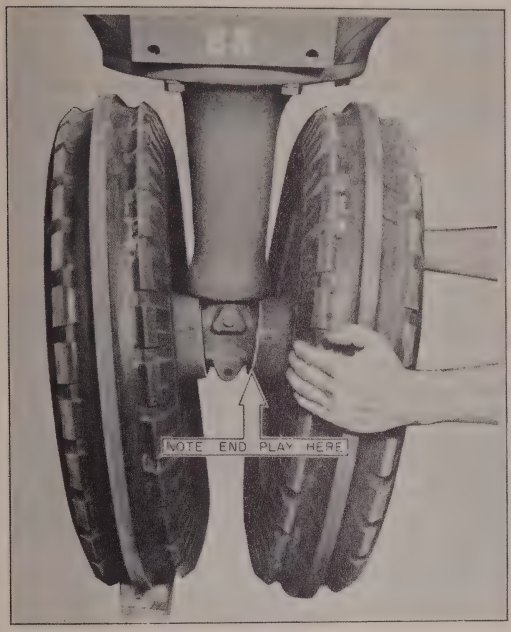


Figure 9-5 Checking Front Wheel Bearing End Play

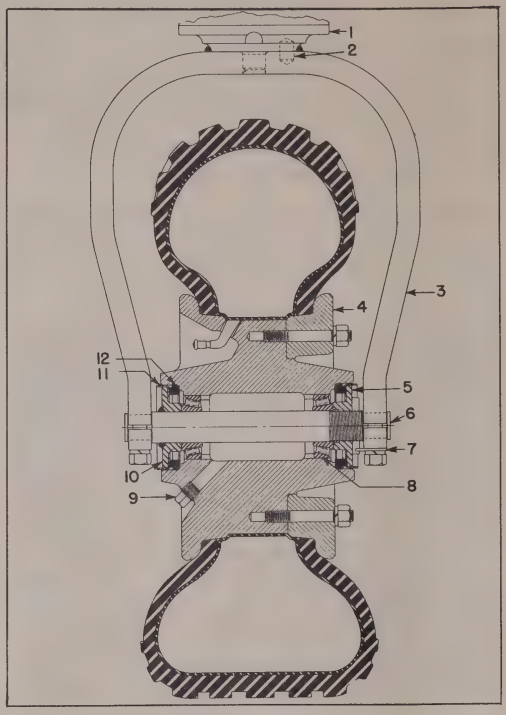


Figure 9-6 Single Front Wheel

1. Front Wheel Fork Spindle
2. Front Wheel Locating Dowel
3. Front Wheel Fork Assembly
4. Front Wheel
5. Front Wheel Bearing Lock Nut
6. Front Wheel Spindle
7. Front Wheel Bearing Nut Lock
8. Tapered Roller Bearing
9. Pipe Plug
10. Front Wheel Spindle Collar
11. Front Wheel Seal Wearing Cup
12. Front Wheel Seal

WHEEL BEARING ADJUSTMENT

End play in the front wheel bearings of the Row Crop and Standard tractors can be detected by raising the front wheel off the ground and checking for movement between the wheel hub and spindle while alternately pushing and pulling on the wheel. (See Figure 9-5.) To check the front wheel bearings on the Industrial tractor, follow the same procedure as outlined for the Row Crop tractor, but check for looseness between the spindle and spindle carrier. If the front wheel bearings are burned out, have excessive play or the front wheel seals are leaking, we recommend that you have your Oliver serviceman disassemble the front wheel for inspection purposes and install new seals.

To adjust the end play of the front wheel bearings on the Row Crop dual front wheel or adjustable front axle and the Standard tractors, remove the hub cap mounting screws, hub cap and hub cap gasket. Remove the bearing nut cotter pin. Tighten the bearing nut while rotating the wheel until a preload is felt on the bearings. Then loosen the bearing nut until the preload is removed. Continue to alternately tighten and loosen the nut until you have definitely established the point where the bearings are properly seated and the torque required to tighten the nut is considerably increased. When this point has been determined, tighten the nut to the next position in which the cotter pin can be inserted through the nut and the hole in the spindle. This will be a maximum

of 1/16 turn because there are two holes drilled through the spindle at right angles to each other. Reinstall the cotter pin and bend one end tightly against the end of the spindle and bend the other end against the nut to prevent them from striking the hub cap. Install the gasket and cap, fastening them in place with the cap screws that were removed.

The front wheel bearings on the Row Crop single front wheel tractor are adjusted by turning the bearing lock nut. Before the lock nut can be turned, the nut lock must be removed from the end of the front wheel fork. (See Figure 9-6.) To do this, set the front wheel on the ground. Remove the spindle cap and nut lock; then reinstall the spindle cap. Raise the front end of the tractor off the ground so that the wheel can be turned freely. Turn the bearing lock nut until the correct adjustment is obtained, as outlined in the preceding paragraph. After the bearings have been correctly adjusted, set the front wheel on the ground and reinstall the nut lock so that its protruding finger is in one of the grooves in the bearing lock nut. Install the spindle cap to complete the adjustment.

To adjust the front wheel bearings on the Industrial tractor, raise the front of the tractor off the ground so that the wheel is free to rotate. Remove the four cap screws that hold the steering knuckle arm to the spindle carrier. Remove the arm and gasket from the carrier. Removing this arm allows the oil from the carrier to drain out. Catch this oil to prevent it from running on the ground or contacting the front tire. Remove the cotter pin from the steering knuckle spindle nut. Tighten the nut while rotating the wheel until a preload is felt on the bearings. Loosen the nut and remove the preload. Continue to alternately tighten and loosen the nut until a point is determined where the bearings have properly seated with a slight preload. Tighten the nut to the next position in which the cotter pin can be inserted through the nut and spindle. Install the cotter pin and bend one end against the nut and the other end against the end of the spindle. Install the gasket and steering knuckle arm, fastening them in place with the four cap screws. Then refill the spindle carrier to the lower edge of the pipe plug hole with the same grade of engine oil that is used in the engine crankcase.

REDUCE SPEED BEFORE TURNING OR USING ONE WHEEL BRAKE

SECTION X

EQUIPMENT

GENERAL

Several mechanical and hydraulic units are available as optional equipment for your tractor to provide a means for controlling the operation of mounted and drawn implements. Some of the mechanical units available are a direct driven power take-off, a belt pulley, mechanical power lift and a mechanical side hill hitch. The hydraulic units include the Hydra-Lectric Control and the Hydraulic Control. In addition several hydraulically controlled mechanical units are available which may be operated by either the Hydra-Lectric or Hydraulic Control.

In addition to the above mentioned optional equipment, your tractor may be equipped with wheel weights, various size tires or tiptoe rear wheels on Row Crop tractors, electric lights, wheel guards and platform extensions, splash panels, counter type or electric hour meter and a seat pad. For a complete list of all optional equipment available for your tractor, contact your Oliver Dealer.

POWER TAKE-OFF

The direct driven, independently controlled power take-off is mounted on the back of the tractor rear main frame. This self-contained unit consists primarily of a drive shaft, clutch assembly, reduction gears and an output shaft. The drive shaft extends from the power take-off on the rear of the tractor through the rear main frame and engine clutch assembly where it engages a splined hub attached to the engine flywheel providing power for the power take-off whenever the tractor engine is in operation. The power take-off is completely independent of the engine clutch. Operation of the power take-off output shaft is controlled by its own clutch mechanism.

The power take-off is engaged and disengaged by a clutch control lever that operates the double plate, dry disc, overcenter clutch assembly. This clutch lever may be installed on either side of the power take-off clutch housing so that it may be operated by either the right or left hand of the operator. To prevent the operator from unintentionally engaging the power take-off, the control lever is locked in the disengaged position when it is pulled back. This lock consists of a lever latch stop screw that should be adjusted so that the clutch lever does not have excessive movement when it is locked in the disengaged position. (See Figure 10-1.)

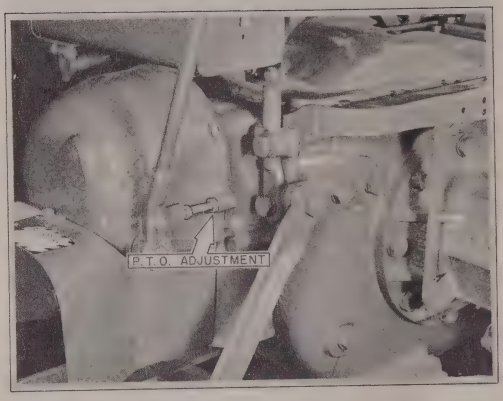


Figure 10-1 Power Take-Off Lever Adjustment

In order to set the power take-off in motion press down on the control lever knob to release the lock latch and move the power take-off lever slowly and steadily toward the rear of the tractor until the clutch is felt to snap into engagement. To disengage the power take-off push the clutch lever forward until the clutch snaps out of engagement and is locked in position by the lock latch.

The tractor is provided with a master safety shield over the power take-off output shaft. This shield is installed for your protection and it must be kept in place at all times.

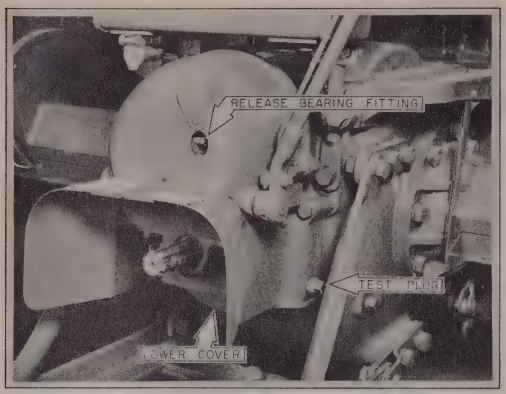


Figure 10-2 Power Take-Off Lubrication

IMPORTANT

UNLESS THESE INSTRUCTIONS ARE FOLLOWED POWER TAKE-OFF SHAFT OR UNIVERSAL JOINT BREAKAGE MAY RESULT.

1-DRAWBAR HITCH POINT MUST BE LOCKED IN LINE WITH POWER TAKE-OFF SHAFT.
2-ARRANGE FRONT BEARING SUPPORT SO THAT POWER LINE WILL OPERATE IN AS STRAIGHT A LINE AS POSSIBLE.
3-AVOID MAKING SHARP TURNS WHILE POWER TAKE-OFF IS OPERATING.
4-MAKE CERTAIN UNIVERSAL JOINTS ARE CORRECTLY SYNCHRONIZED.
5-ENGAGE CLUTCH SLOWLY BUT FIRMLY TO REDUCE HIGH STARTING LOAD.
(SEE OPERATORS MANUAL)

Figure 10-3 Power Take-Off Transfer

LUBRICATION

The internal mechanism of the power take-off is lubricated with seasonal grade transmission oil. Check the oil every 30 days and maintain it level with the lower edge of the test plug hole on the lower right side of the power take-off housing. (See Figure 10-2.) Change the oil twice each year to coincide with the transmission oil changes. To change the oil, remove the power take-off lower cover and wash it in a cleaning solvent. Reinstall the cover and add one pint of seasonal grade transmission oil through the test plug hole.

The power take-off clutch release bearing operates only when the power take-off clutch is engaged. This bearing requires grease daily when the power take-off is in operation. Do not overgrease because the excess lubricant may come into contact with the clutch facings which may cause the clutch to slip or chatter. One stroke with the grease gun daily or every 10 hours is sufficient lubrication when the power take-off is in operation. (See Figure 10-2.)

POWER TAKE-OFF TRANSFER

The transfer installed on the power take-off shield of your tractor is designed to eliminate unnecessary breakage of the drive shaft, output shaft, universal joints and all other parts of the power take-off and connections. This transfer contains a list of five precautions that you should follow before and after connecting the power take-off of the tractor to a power take-off driven machine. (See Figure 10-3.) If these five suggestions are followed, the power take-off will give you satisfactory service throughout the entire life of the tractor.

In order to better understand the five suggestions or precautions listed on the power take-off transfer, each is discussed individually and fully below.

1. **Drawbar Hitch Point Must Be Locked In Line With The Power Take-Off Shaft** - This specification was originally set forth in the American Society Of Agricultural Engineers and Society Of Automotive Engineers Standard For Power Take-Off And Drawbar Hitch Locations. The purpose of this standard was to simplify the problem of connecting one company's driven implement to another manufacturer's tractor without supplying special attaching equipment. Since the majority of manufacturers design their machines to comply with this standard, the power train from the tractor to a driven implement is not in correct alignment unless the implement hitch point is locked directly behind and in line with the power take-off output shaft.

2. **Arrange Front Bearing Support So That Power Line Will Operate In As Straight A Line As Possible** - On some applications of the power take-off with drawn implements, such as the combine or corn picker, a series of at least three universal joints should be used between the driving shaft on the tractor and the driven shaft on the implement. In this instance, the second

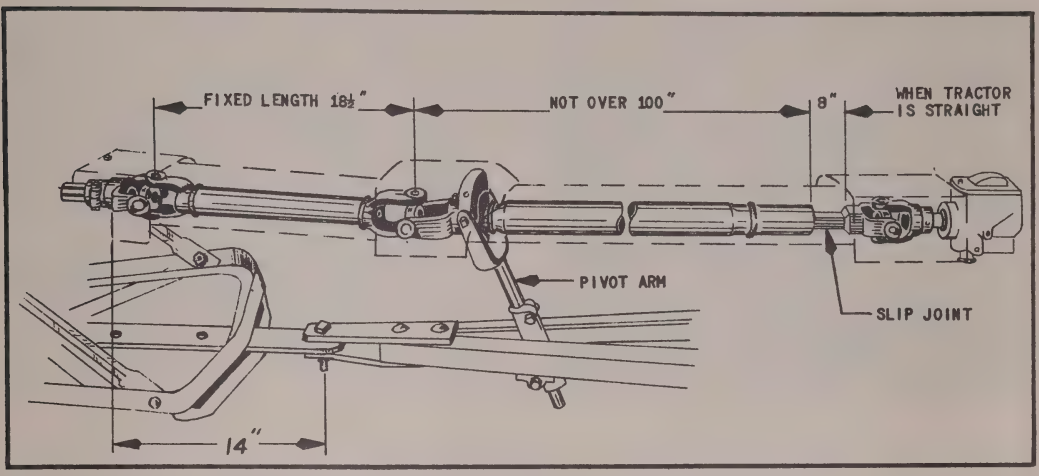


Figure 10-4 Power Take-Off and Universal Joint Attachment

yoke of the middle universal joint is supported in a bearing attached to an adjustable pivot arm. (See Figure 10-4.) It is this pivot arm that must be extended or contracted so that as straight a line as possible through the joints is obtained for normal field operation.

If the center universal joint is not in a straight line with the two end joints, the driven shaft will not rotate at a constant speed and additional loads will be imposed on the driving and driven shaft bearings and the center support bearing. Also the power output required by the tractor engine to start the machine in motion and to maintain it in operation is increased.

3. **Avoid Making Sharp Turns While The Power Take-Off Is Operating** - The operator should avoid making sharp turns while the power take-off is in operation because it is possible to lock universal joints. If the turn is not sharp enough to lock the joints, rough operation will result when the turn causes the joints to operate at an angle of approximately 25 degrees. (See Angle X in Figure 10-5 at A.) Therefore, when making sharp turns, it is recommended that the driven machine be cleared and the power take-off disengaged until the implement is directly behind the tractor and the power train is again aligned. The independently controlled power take-off on Oliver tractors permits easy engagement and disengagement for these conditions.

4. **Make Certain Universal Joints Are Properly Synchronized** - Synchronizing or keeping the universal joints in phase means to maintain the joints properly positioned on the shafts so that nearly constant speed is delivered to the driven shaft on the implement. Where only one universal joint is used in a power train, the position of the joint on the shafts is immaterial and may be disregarded. (See Figure 10-5 at A.) Where two universal joints are used in a power take-off connection and the driving and driven shafts are parallel and offset from each other either horizontally or vertically, or both, they should be positioned on the shaft as shown in Figure 10-5 at B. That is, the universal joint yokes on the intermediate shaft should be in the same plane. When the driving and driven shafts are not parallel, always position the yokes on the ends of the intermediate shaft in the planes formed by the intersection of the driving and driven shafts with the intermediate shaft. (See Figure 10-5 at B and C.)

As a rule, the universal joint yokes cannot be assembled incorrectly on the shafts. However, where it is possible to assemble them out of phase, it is well to understand their function and how to assemble them properly so that they will be properly synchronized during normal field operation.

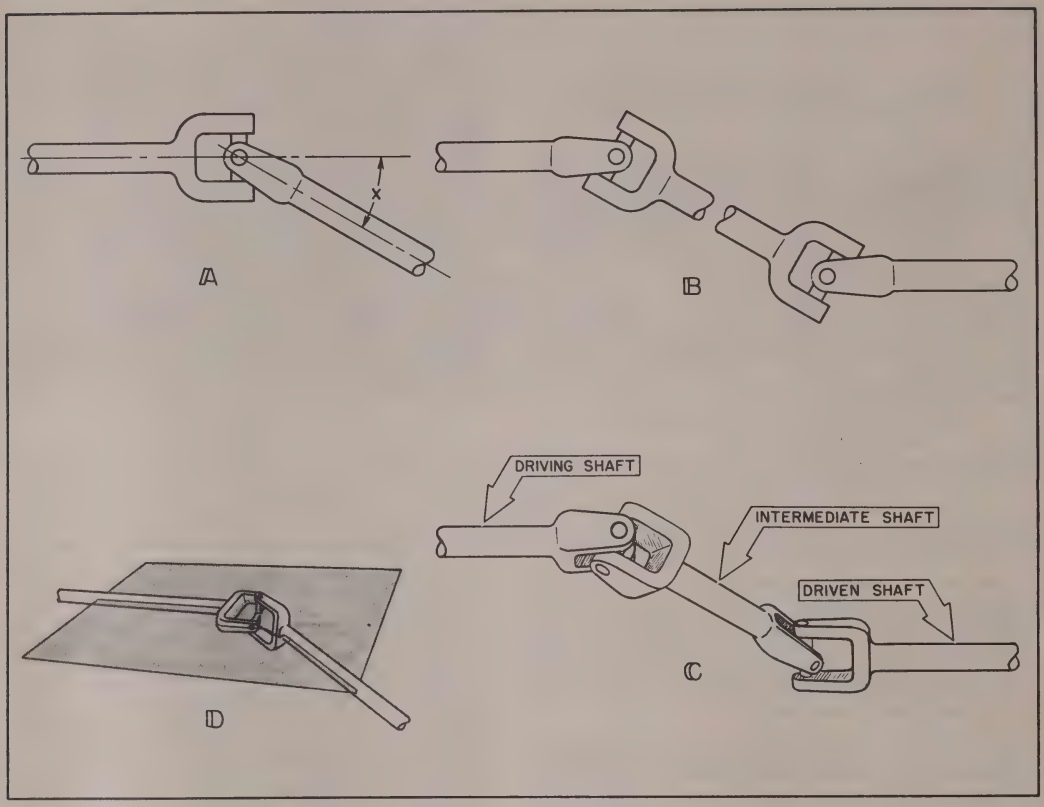


Figure 10-5 Universal Joints

5. **Engage Clutch Slowly But Firmly To Reduce High Starting Load -** Rapid engagement of the power take-off clutch is the greatest single factor involved in breakage of the power take-off shafts and universal joints. It is believed that with the introduction of the independently controlled power take-off on Oliver tractors, the operator has a tendency to engage the clutch too quickly. The majority of tractor operators are familiar with the proper engagement of the engine clutch and automatically engage it slowly to reduce body shock. The same care should be exercised in engaging the power take-off clutch. If the power take-off is engaged too quickly, a shock load is imposed on the power take-off shaft and universal joints which eventually cause these parts to fail.

In addition to the above precautions, always make absolutely certain that the telescoping shaft on the implement is free of all foreign material and slides easily. Also, when traveling through depressions in the ground, be careful not to bottom or exceed the contracted limits of the slip joint because damage to the power take-off mechanism will result. (See Figure 10-4.)

WARNING

KEEP POWER TAKE-OFF SHIELDS IN PLACE AT ALL TIMES.

KEEP HANDS AWAY FROM ALL MOVING PARTS

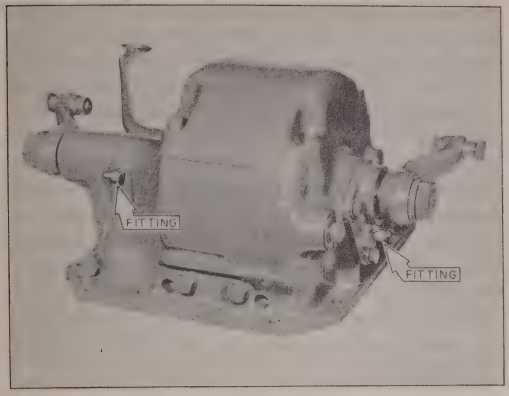


Figure 10-6 Power Lift Lubrication

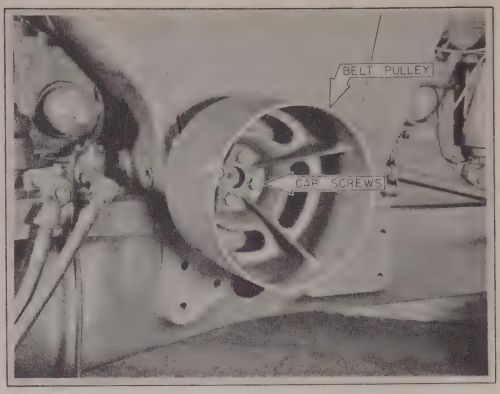


Figure 10-7 Belt Pulley

MECHANICAL POWER LIFT

The mechanical power lift is designed for operating front mounted implements on Row Crop tractors. This unit, which is installed over the transmission in place of the transmission cover, provides the operator with positive lift and trip control for tractor mounted equipment. The mechanical power lift is a self-contained unit and it may be installed or removed without disturbing other parts of the tractor.

LUBRICATION

The internal mechanism of the mechanical power lift is lubricated by the pumping action of the transmission gears. Consequently, no special lubrication attention is necessary other than lubricating the power lift shaft bearings on each side of the housing with pressure gun grease daily or every ten hours of power lift operation. (See Figure 10-6.)

BELT PULLEY ASSEMBLY

The belt pulley assembly is installed on the front of the tractor transmission. This assembly is a self-contained unit that consists primarily of a pulley, drive shaft, gears, bearings and housing. Due to its simplicity, it requires very little special attention after it is installed on the tractor.

BELT PULLEY

The belt pulley should be removed when the tractor is used for continuous field work because the vibration of the pulley when driving the tractor over rough ground may damage the bearings and bevel gears. To remove the pulley, remove the four cap screws that hold the pulley to the flange on the end of the pulley shaft. Tie the cap screws to the pulley to keep them from becoming lost. Do not reinstall the cap screws in the flange on the shaft because they will damage the oil seal if they are turned in too far. Also, they are extremely dangerous to personnel working around the tractor. (See Figure 10-7.)

When using the tractor for belt pulley operation, always ground the tractor with a chain or similar electrical conductor to remove static electricity.

CAUTION

ALWAYS TIGHTEN THE CAP SCREWS SECURELY WHEN INSTALLING THE BELT PULLEY ON THE TRACTOR.

LUBRICATION

The belt pulley assembly is lubricated by the pumping action of the transmission gears. Oil enters the pulley housing through an oil hole in the front of the transmission and returns to the transmission through the front bearing on the transmission input shaft.

After installing a complete belt pulley assembly on a tractor, add one quart of seasonal grade transmission oil through the pulley filler plug opening to provide lubrication until normal circulation is obtained from the transmission. (See Figure 10-8.)

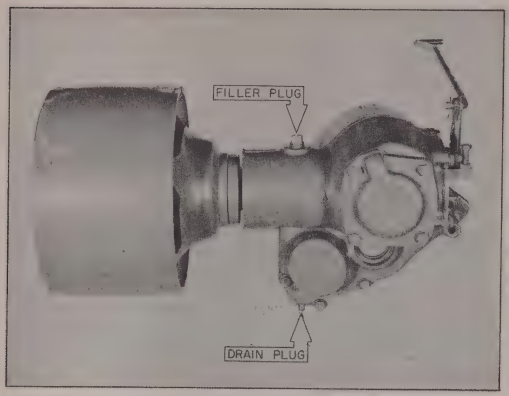


Figure 10-8 Belt Pulley Lubrication

Remove the pipe plug from the base of the belt pulley housing and drain the oil twice each year to coincide with the transmission oil change. Reinstall the drain plug and add one quart of seasonal grade transmission oil to the assembly through the filler plug opening at the same time the transmission is being filled.

When using the pulley for belt work, always set the tractor so that the front wheels are level with or lower than the rear wheels to ensure adequate lubrication of the belt pulley assembly.

NOTE

IF THE TRACTOR IS USED FOR 60 OR 70 HOURS OF CONTINUOUS BELT WORK, DRAIN ONE GALLON OF OIL FROM THE FINAL DRIVE COMPARTMENT AND POUR IT INTO THE TRANSMISSION FILLER CAP OPENING. ADDITION OF NEW OIL TO MAINTAIN THE CORRECT TRANSMISSION OIL LEVEL IS NOT REQUIRED.

TIRES AND TUBES

Proper inflation will help to ensure the maximum service life from each tire on your tractor. Underinflation should be avoided at all times because it is extremely detrimental to tire life. Underinflation will cause the tire to flex and buckle under strain. This will cause a series of diagonal cracks to appear in the cord fabric or tire side wall. Underinflation may also cause the tire to slip on the rim, which will tear the valve stem from the tube. Overinflation will cause the rear tires to wear rapidly as a result of excessive slippage from lack of traction.

When special or heavy equipment is installed on the tractor, wheel weights installed, or liquid weight added to the tires, the tire inflation pressure may need to be increased. Always check the specifications in Section I for the proper tire pressure to be used when placing additional weight on the tractor. The last figure in each horizontal column is the maximum load that should be placed on a tire of the given size.

NOTE

WHEN PLOWING INCREASE THE PRESSURE IN THE FURROW TIRE FOUR POUNDS ABOVE NORMAL.

Always keep the tires clean and out of the direct rays of the sun when the tractor is not in use. Oil, fuel, grease, calcium chloride and certain spraying solutions deteriorate rubber and must be cleaned from the outside of the tires. If necessary, the tires may be washed with soap and water to remove the foreign material.

NOTE

CHECK TIRES REGULARLY AND MAINTAIN THE CORRECT PRESSURE. USE A GOOD QUALITY GAUGE. A SPECIAL GAUGE IS REQUIRED WHEN TIRES CONTAIN LIQUID. WASH GAUGE AFTER USING.

WHEEL WEIGHTS

Slippage of the rear tires on the tractor may be reduced by adding cast iron wheel weights, When adding these weights to the rear wheels, it is important that the tractor weight is not increased beyond the load that the tires will safely support. Compare the weight of the tractor on the tires with the table in Section I to make certain that the addition of wheel weights will not exceed the maximum load the tires should carry. If the weight of the tractor and wheel weights exceed the safe load limit for the tires, larger tires should be installed on the tractor before the weights are added. The addition of one pair of rear wheel weights increases the tractor weight by approximately 280 pounds.

The most economical and efficient method of increasing weight and preventing tire slippage is the addition of liquid in the rear tires. In climates where freezing temperatures are not encountered in any season of the year, water may be added to the tires. In cold climates, the least expensive anti-freeze solution for adding weight to the tires is calcium chloride ($CaCl_2$) and water. To mix a solution of calcium chloride and water, refer to the specifications in Section I to determine the exact amount of ingredients required to fill each of the tires on the tractor 75 to 80% full. Then fill a container with the correct amount of water and add the required amount of calcium chloride.

WARNING

WHEN CALCIUM CHLORIDE AND WATER ARE MIXED, A VIOLENT CHEMICAL REACTION OCCURS WHICH CAUSES HIGH TEMPERATURES. ADD THE CALCIUM CHLORIDE TO THE WATER AND STIR - DO NOT ADD THE WATER TO THE CALCIUM CHLORIDE. BE SURE TO ALLOW THE MIXTURE TO COOL BEFORE ATTEMPTING TO FILL THE TIRES.

After the calcium chloride and water solution has cooled, proceed to fill the tires. To do this, obtain an adapter and a length of ordinary garden hose from your local hardware dealer. The adapter should have an air escape valve built into it to allow the air to escape as the solution runs into the tire. Raise and block the tire off the ground and rotate the wheel until the valve is in the uppermost position. Remove the valve core and connect the garden hose to the valve stem by means of the adapter. With the use of a tank above the level of the valve stem or a pump, force the solution into the tire until it begins to overflow through the air escape valve in the adapter. At this point the tire will be approximately 75 to 80% full. Install the valve core and inflate the tire to the correct recommended pressure.

Check the tires with a gauge designed to be used on tires containing an anti-freeze solution. Wash the gauge thoroughly after the tires are checked to remove the solution. A conventional tire pressure gauge will be severely damaged if it is allowed to come into contact with calcium chloride.

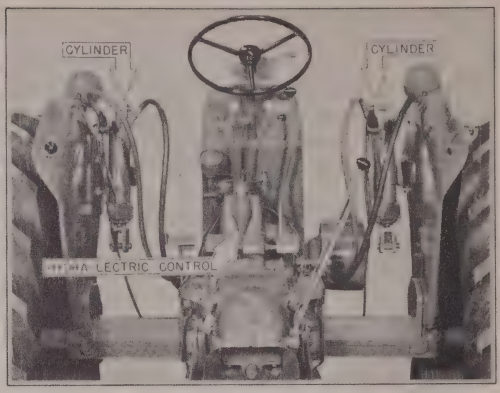


Figure 10-9 Hydra-Lectric Control

HYDRA-LECTRIC CONTROL

The Hydra-Lectric Control is installed over the transmission of the tractor in the same position as the transmission cover or mechanical power lift. This hydraulic unit is designed to raise, lower or change the working depth of either mounted or drawn implements. (See Figure 10-9.)

Hydra-Lectric Controls consist primarily of a control mounting base, oil reservoir, automatically energized electric controls, hoses, one or two cylinders, and a direct driven, constant mesh, positive displacement, gear type pump. The cylinders are availabe in either three or four-inch sizes.

Hydra-Lectric Controls equipped with two cylinders are provided with two hydraulic control hand levers, two selector valve body assemblies, two solenoid and switch assemblies, two restrictor and two free-flow swivel assemblies, and two thermal relief valves. Hydra-Lectric Controls equipped with one cylinder are provided with only one of the above mentioned items in the unit.

CHECKING THE HYDRA-LECTRIC CONTROL

Before attempting to operate the Hydra-Lectric Control when the tractor is new or after it has been in storage, read completely through this discussion while making a thorough study of the unit until you are thoroughly familiar with the system. To make certain that the Hydra-Lectric Control is in the proper operating condition, check and test the following.

1. Check the oil level in the reservoir.

2. Check the hose connections. The connections should be tight and free of oil leaks. On remote cylinder connections, for drawn implements, check the breakaway couplings, self-sealing couplings and all other connections.

3. Check the electrical connections at the cylinder, reservoir cover, switch and fuses to make sure they are clean and tight.

4. Examine the Hydra-Lectric fuse.

5. Examine the Hydra-Lectric Control wiring harness for breaks and worn spots. Check for interference that will wear through the protective covering on the harness which will cause short circuits.

6. Check the micro switch plunger on the rod end of the cylinder for freedom of movement.

7. With the cylinders in their supports on the wheel guards, start the tractor engine and run it at a slow idle speed. Then nudge the Hydra-Lectric control lever into the *Visual Up* or *Visual Down* position. This check will indicate whether the pistons and rods are free to move in the cylinders. Turn off the key switch and stop the engine.

8. With the cylinders partially extended from Step 7 and the stop collars away from the cylinder head, turn the key switch on and move the hydraulic control levers forward into the *Up* position. If the electrical system is functioning correctly, the levers will remain locked in this position. To return the levers to the neutral position, move them into the *Visual Up* position or turn the key switch off. Then repeat this same procedure to see if the electrical system will lock the levers in the *Down* position.

9. Place the stop collar on the piston rod against the micro switch in the end of the cylinder head. Turn the key switch on and move the hydraulic control lever into either the *Visual Up* or *Visual Down* position. As this is done, the stop collar should be drawn against the electromagnet in the cylinder head with a sharp click.

10. When all the above tests and inspections have been completed, start the tractor engine. With the engine running at idle speed, operate the Hydra-Lectric Control with the hydraulic control levers as outlined in the following discussions under Automatic Operation and Adjusting Depth Control.

OPERATION

AUTOMATIC OPERATION

Neutral Position

The neutral position of the Hydra-Lectric Control is that position to which the unit returns when all electrical circuits are open and the hydraulic control lever is held in its self-centering position by the coil type centering springs. The Hydra-Lectric Controls will return to the neutral position whenever the hydraulic control lever is released from the *Visual Up* or *Visual Down* position, or when the cylinder reaches the end of its stroke which breaks the automatic *Up* or *Down* electrical circuit. When the Hydra-Lectric Control is in the neutral position, oil is circulated from the reservoir through the hydraulic pump assembly, through the selector valve body assembly and back into the reservoir after flowing through the bypass type oil filter assembly. The cylinders are locked in a stationary position when the unit is in the neutral position by ball check valves which close and prevent the escape of oil from either the rod end or base end of the cylinder.

Raising The Implement

To extend the cylinder and raise the implement, move the hydraulic control hand lever forward into the *Up* position. (See Figure 10-10.) This movement of the lever completes an electrical circuit that locks the lever in position. Oil from the hydraulic pump then flows into the base end of the cylinder, which extends the piston rod and raises the implement. When the piston reaches the end of its stroke, a switch inside the cylinder is opened, which breaks the electrical circuit and the system automatically returns to the neutral position.

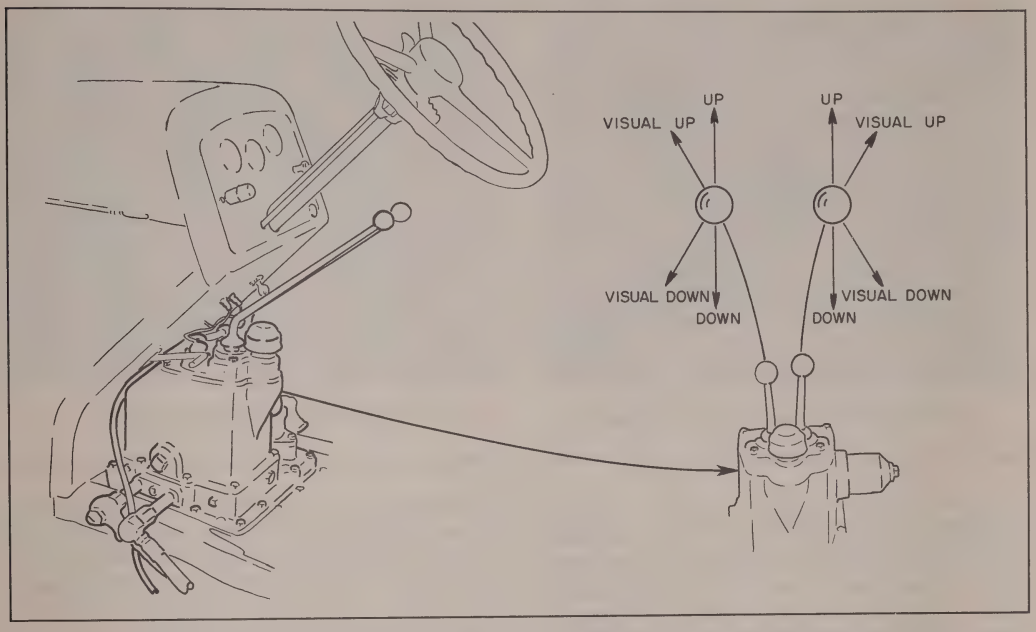


Figure 10-10 Hydra-Lectric Control Operation

Lowering The Implement

To lower the implement or retract the hydraulic cylinder, move the hydraulic control hand lever straight back toward the tractor seat into the *Down* position. (See Figure 10-10.) This movement closes another electrical circuit that locks the lever in the *Down* position. Oil then flows from the hydraulic pump into the rod end of the cylinder causing the implement to lower or the hydraulic cylinder to contract. As the piston and rod move into the cylinder, a stop collar on the piston rod contacts a micro switch in the head of the cylinder. (See Figure 10-11.) This micro switch breaks the electrical circuit, allowing the system to return to the neutral position.

ADJUSTING DEPTH CONTROL

As outlined in the discussion on Lowering The Implement, it is the action of the stop collar on the piston rod that stops the downward movement of the implement or the retraction of the hydraulic cylinder when the hydraulic control lever is in the *Down* position. (See Figure 10-11.) This collar, which is held in place on the rod by friction, may be moved to any new location on the rod by the application of a little force. Therefore, the downward movement of the implement may be stopped at any point the operator desires simply by changing the location of the collar on the rod. The position of the collar may be changed by the operator on the tractor seat by using the *Visual Up* and *Visual Down* positions of the hydraulic hand lever. This hydraulic hand lever returns to neutral whenever it is released from these two positions and the cylinder remains at the point set by the lever before it is released. Consequently, the lever must be held in the desired position until the correct implement working depth is obtained.

In the following discussions, note that the *Visual Up* and *Visual Down* positions of the hydraulic control levers operate the cylinders exactly as the *Up* and *Down* positions, but they override or control the action of the stop collar on the rod.

CHECK POSITION OF HYDRA-LECTRIC CONTROL LEVER BEFORE STARTING TRACTOR

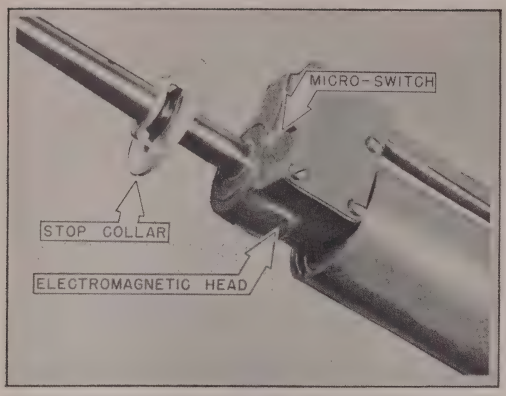


Figure 10-11 Hydra-Lectric Control Cylinder

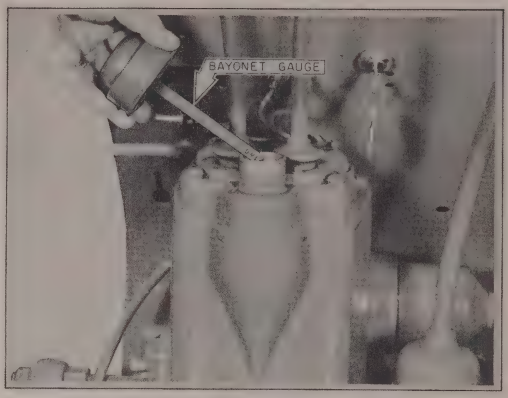


Figure 10-12 Checking Oil Level

Decreasing Depth Control

To decrease the working depth of an implement, the implement must first be lowered to the down position. Move the hydraulic control lever to the outside of the unit and forward into the *Visual Up* position. (See Figure 10-10.) This movement of the hydraulic control lever completes an electrical circuit that holds the stop collar on the piston rod against the electromagnet in the end of the cylinder. When the desired implement working depth is obtained, release the lever and the hydraulic system immediately returns to the neutral position.

Increasing Depth Control

To increase the working depth of an implement, move the hydraulic control lever toward the outside of the unit and back toward the tractor seat into the *Visual Down* position. (See Figure 10-10.) This position of the hydraulic control lever is strictly a manual position and the electrical system has no control over the operation of the unit. Consequently, after an implement has been lowered and as the working depth is increased, the stop collar on the piston rod is forced to slide along the rod to a new location. This new setting of the collar is the depth to which an implement will automatically lower in future operation.

SERVICING

It is very important to keep all parts of the Hydra-Lectric Control as clean as possible to eliminate the possibility of dirt or other foreign material entering the system. Cleanliness cannot be overemphasized to anyone operating or servicing the unit. Any dirt or grit that may enter the unit will cause excessive wear of the pump, cylinders and valves, which will result in oil leaks and loss of pressure.

CHECKING OIL LEVEL

A bayonet type gauge is attached to the air breather to measure the level of the fluid in the reservoir. Check the level of this fluid daily and maintain it within the limits of the *Full* and *Low* marks on the gauge. (See Figure 10-12.) If the tractor is operated with the oil in the reservoir below the *Low* mark, there is a possibility of the unit becoming overheated because the oil also acts as a coolant. If the reservoir is too full, the oil may splash into the breather and eventually work dirt from the breather into the reservoir.

CHANGING OIL

Change the oil in the Hydra-Lectric Control once a year or every 1000 hours of tractor operation, depending upon which comes first. To drain the unit remove the rear pipe plug from the left side of the control mounting base. (See Figure 10-13.) Disconnect the hoses from the cylinders and allow them to drain. If the hoses are equipped with self-sealing couplings, the couplings must be removed before the oil can be removed. Then work the piston rod in and out of the cylinder until all the oil is pumped out.

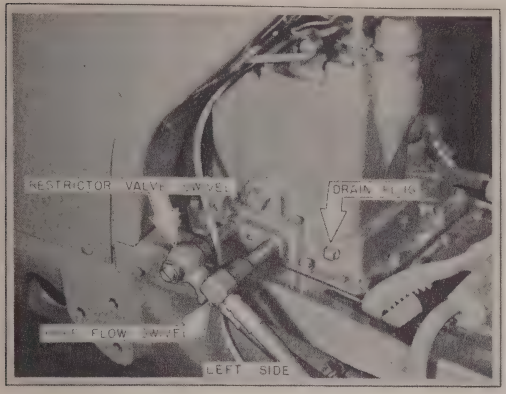


Figure 10-13 Hydra-Lectric Control Drain Plug

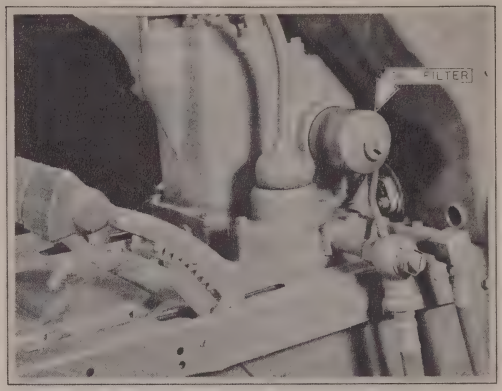


Figure 10-14 Hydra-Lectric Oil Filter

CAUTION

NEVER OPERATE THE TRACTOR WHEN THE HYDRA-LECTRIC CONTROL IS DRAINED.

Fill the Hydra-Lectric Control with a high grade SAE 10W engine lubricating oil. To fill the unit, pour oil into each end of the cylinders through the openings left by the removal of the hoses, and connect the hoses to the cylinders. Pour the remaining oil into the reservoir housing through the opening left by the removal of the air breather and bayonet gauge. To determine the exact amount of oil required to fill the unit, refer to the specifications in Section I. After the Hydra-Lectric Control has been filled with oil, remove the air from the system by bleeding the unit as outlined under Bleeding The Hydra-Lectric Control.

OIL FILTER ASSEMBLY

The Hydra-Lectric Control is provided with an oil filter assembly on the right-hand side of the reservoir housing for removing all particles of dirt and other foreign material from the oil. (See Figure 10-14.) The element in this oil filter assembly, part number 1LA-5351, should be changed after the first 100 hours of tractor operation. After this initial change, the element should be replaced every 1000 hours of tractor operation or once a year, whichever comes first. Since the oil change period and the filter element change period coincide, it is recommended that they both be changed at the same time.

Servicing Oil Filter Assembly

To change an oil filter element, proceed as follows:

1. Clean away all dirt from around the oil filter body.
2. Loosen the oil filter assembly cap screw and remove the complete oil filter assembly.
3. Remove and discard the oil filter element from the oil filter body.
4. Remove the element bottom rubber gasket, spring retainer and spring, and the cap screw from the filter body.
5. Clean the filter body in a cleaning solvent.
6. Reinstall the cap screw with gasket, spring retainer and spring, and the element bottom rubber gasket in the filter body.
7. Install a new oil filter element over the cap screw in the filter body. Install the element so that the end marked *Top* will be toward the reservoir when the filter assembly is installed.
8. Inspect the filter body gasket in the reservoir housing. If it is hardened, damaged or stretched so that it does not provide a smooth sealing surface, it should be replaced.
9. See that the element top rubber gasket is properly positioned in its recess in the reservoir housing. This gasket may be coated with a clean, heavy grease to hold it in place while the filter is being installed.

10. Place the filter body in position over the gasket in the reservoir housing and secure it in place with the cap screw. Tighten the cap screw sufficiently to prevent oil leaks. Excessive tightening of the screw may distort the filter or cause failure of the screw.

BLEEDING THE HYDRA-LECTRIC CONTROL

It will be necessary to bleed the hydraulic system after it has been completely filled with oil or if the operation of the unit becomes retarded and spongy. To bleed the system, loosen the fluid return hose at the cylinder two or three turns. This fluid return hose is connected to the base end of the cylinder when the piston rod is extended and to the rod end when the piston rod is contracted. Start the tractor engine and operate the unit through one complete stroke by moving the hydraulic control lever into the *Visual Up* or *Visual Down* position. Tighten the hose and loosen the other hose at the cylinder. Then operate the cylinder through another stroke. Continue this procedure until oil that is free of air bubbles escapes around the loosened connections. Check and replenish the oil in the Hydra-Lectric Control reservoir before operating the tractor.

CARE OF HOSES

When connecting or disconnecting hydraulic hoses, do not let the ends touch the ground or any other object. Before connecting the hoses, wipe the ends with a clean lint-free cloth. If possible, wash the ends in a cleaning solvent before wiping. Never fail to cap or plug all openings in the hydraulic system whenever any part is removed. Cover the male ends of the hoses with 1/2 inch pipe caps, and install 1/2 inch pipe plugs in the female openings. If plugs and caps are not available, use lint-free cloths to wrap around the ends of the hoses and to plug all other openings. When removing the remote control extension hoses and breakaway couplings for drawn implements, connect the ends of the hoses together by means of the coupling and store them in a cool, dry place when they are not in use.

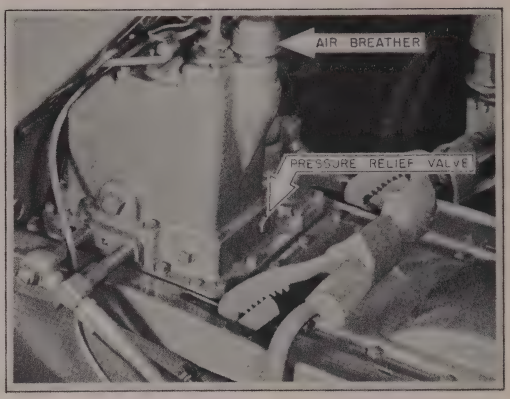


Figure 10-15 Pressure Relief Valve

AIR BREATHER

Each Hydra-Lectric Control is equipped with a small air breather on top of the reservoir, directly behind the hydraulic control levers. (See Figure 10-15.) The air breather should be removed and cleaned each day or every 10 hours of tractor operation. To clean the breather, wash it in kerosene or other cleaning solvent. If the breather is clogged to the point where washing will no longer remove the foreign material accumulated in the metal wool, a new breather should be installed. After a breather has been washed, allow it to dry and oil the wool with a few drops of clean engine oil before reinstalling it on the reservoir cover.

FAULTY OPERATION

The Hydra-Lectric Control will not operate satisfactorily if internal or external leakage occurs. External leaks are quite easily detected and remedied. However, internal leaks are not easily noticed. When internal leaks are present because of damaged valves, seals or gaskets, they may usually be detected by the improper operation of the unit or by the necessity of frequently adding oil. One indication of internal leakage is that the implement will slowly settle to the ground from the raised position. If it is in the lowered position, it may gradually change its working depth. When these internal leaks occur, it is recommended that you have your Oliver service man disassemble and repair the unit.

Figure 10-16 Adjustable Pressure Relief Valve

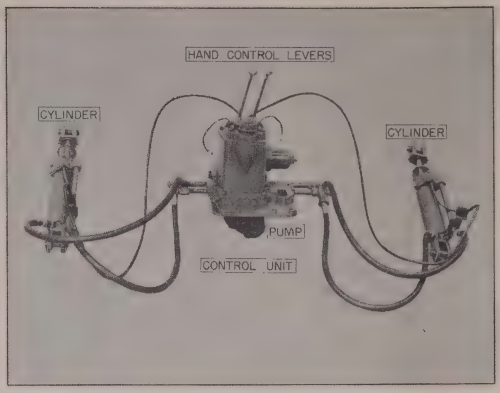


Figure 10-17 Hydra-Lectric Cylinder To Reservoir Hose Connections

PRESSURE RELIEF VALVE

The Hydra-Lectric Control is provided with a poppet type, spring loaded pressure relief valve in the right rear side of the control mounting base to prevent the hydraulic pump from developing excessive pressures which might result in damage to the unit. (See Figure 10-15.) The spring tension on the pressure relief valve is adjusted at the factory so that it will open when the hydraulic pump develops a pressure of approximately 1000 pounds per square inch. If the unit becomes overloaded or the normal flow of oil is restricted, the pressure relief valve opens and by-passes the oil from the pump directly back into the reservoir. As the relief valve opens, it creates a buzzing sound that is quite audible to the operator on the tractor seat. Never attempt to change the adjustment of the pressure relief valve.

ADJUSTABLE RELIEF VALVE

An adjustable relief valve is available as optional equipment for all Hydra-Lectric Controls. (See Figure 10-16.) This valve is completely interchangeable with the regular pressure relief valve installed in each unit at the time of manufacture.

The adjustable relief valve provides a convenient means for reducing the rate of cylinder travel. Thus, the time required to raise or lower an implement is increased, but the shock loads developed when the cylinders reach the end of their stroke are reduced.

When the adjustable relief valve is turned all the way in, the bypass feature of the valve is completely sealed off and the valve functions in the same manner as the regular pressure relief valve. By turning the adjustable relief valve out, part of the oil is by-passed directly to the reservoir instead of being forced to the cylinders. Consequently, the effective pump delivery to the cylinder is decreased which in turn reduces the rate of cylinder travel. The farther the pressure relief valve is turned out, the greater the amount of oil that is bypassed and the slower the cylinders operate. The maximum bypass of oil is obtained when the restrictor is turned out of the relief valve nut approximately eight or nine turns. The adjustable relief valve should not be opened more than this recommended eight or nine turns.

RESTRICTOR SWIVEL ASSEMBLIES

The front port opening on the left-hand side and the rear port opening on the right-hand side of the control mounting base are the return ports for oil entering the reservoir from the cylinders when an implement is being lowered. The swivels at these ports, which are connected by hoses to the base end of the cylinders, contain restrictor valves consisting of a spring and plunger. (See Figure 10-17.) The tension on the spring and the amount of restriction obtained may be changed by adjusting the guide in the body of the swivel.

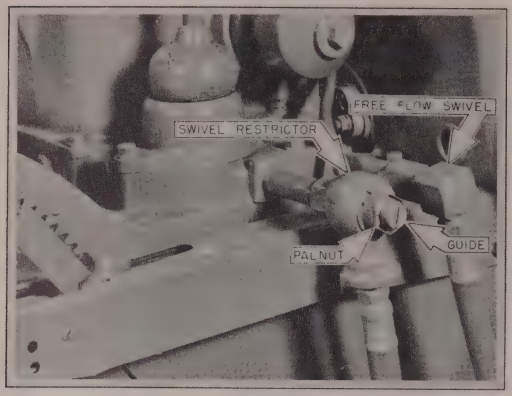


Figure 10-18 Restrictor Valve Adjustment

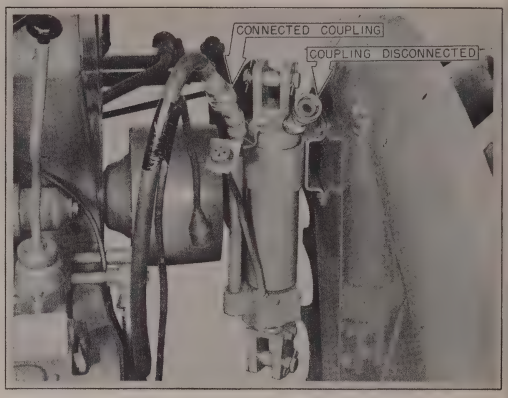


Figure 10-19 Disconnecting Self-Sealing Couplings

The purpose of the restrictor valves in the restrictor swivels is to maintain the flow of oil leaving the base end of the cylinder equal to the quantity of oil entering the rod end when an implement is being lowered. If the valve does not sufficiently restrict the flow of oil, the implement will force the oil from the base end of the cylinder faster then the hydraulic pump can supply it to the rod end. Consequently, the implement has a tendency to bounce as it is lowering. Conversely, if the valve is adjusted so that too much restriction is obtained, the implement will lower too slowly and the rod end of the cylinder will not be able to receive the full oil delivery from the hydraulic pump. This results in the pump building up excessive pressures, causing the relief valve to open.

To adjust the restrictor swivel valve, loosen the Palnut on the slotted guide and turn the guide in or out with a screw driver until the desired amount of restriction is obtained. (See Figure 10-18.) The restrictor swivel valves should be adjusted so that the implement will lower at maximum speed without bouncing. After the adjustment has been completed, lock the guide in place by tightening the Palnut.

MOMENTARY RESTRICTOR SWIVEL ASSEMBLY

Hydra-Lectric Controls that are used to operate single acting cylinders have a momentary restrictor swivel assembly installed in either the front port opening on the right-hand side or in the rear port opening on the left-hand side of the control mounting base in place of the regular free-flow swivel assembly. This momentary restrictor swivel assembly which is connected to a hose leading directly into the reservoir through the drain plug opening, is painted yellow to identify it from the restrictor swivel assembly, which is painted green. The momentary restrictor swivel assemblies require no adjustment by the operator or other periodic attention.

DRAWN IMPLEMENTS

Hydra-Lectric Controls that are used for operating both mounted and drawn implements must have extension hoses and an electrical cable installed before the cylinder on a drawn implement can be operated. To convert from mounted to drawn implement operation, follow the steps outlined below:

1. Disconnect the electrical cable and the hoses from the cylinder. (See Figure 10-19.)

2. Install the hoses and cable in the support on the right-hand side of the platform. (See Figure 10-20.)

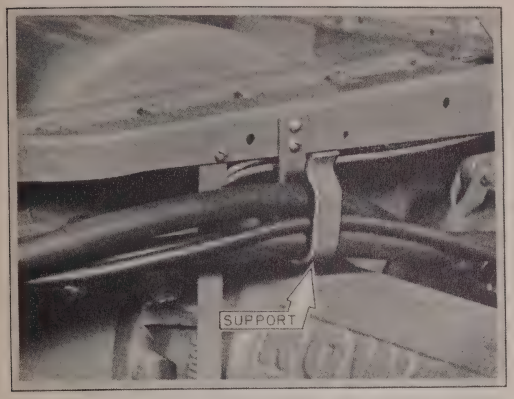


Figure 10-20 Hoses And Cable In Support

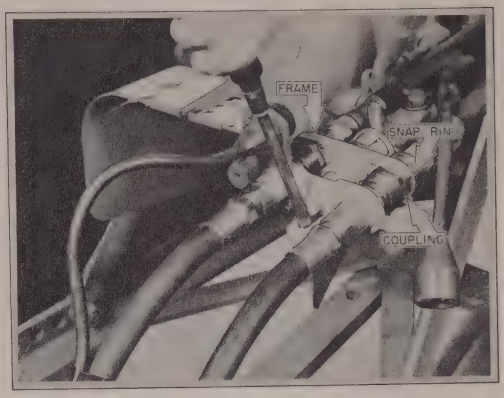


Figure 10-21 Connecting Breakaway Coupling

3. Install the hoses in the breakaway frame with latch. (See Figure 10-21.) When installing these hoses, place them in the frame so that the hose leading to the free-flow swivel in the front port opening on the right-hand side of the control mounting base is on the inside or nearest the rear main frame. Secure the couplings in the frame with snap ring attached to the frame.

4. Install the extension hoses and the extension cable in the hose support bracket on the end of the support rod of the implement.

5. Guide the breakaway frame on the ends of the extension hoses into the breakaway frame with latch and connect them with the aid of a screw driver. (See Figure 10-21.)

6. Connect the electrical cables at the breakaway frame. When connecting these cables, be sure the teardrop shaped signals on the connector are aligned before making the connection.

7. Remove the cylinder from its support on the right-hand wheel guard and install it on the implement. (See Figure 10-22.)

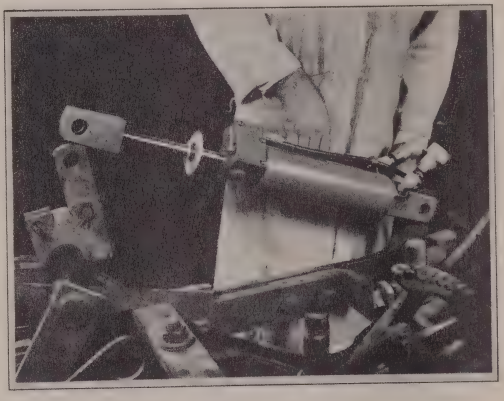


Figure 10-22 Installing Cylinder On Implement

8. Connect the extension hoses and cable to the cylinder.

9. Adjust the hoses in the bracket on the end of the implement support rod so that only the amount of hose necessary to reach the breakaway frame is forward of the rod. When properly installed, the breakaway frame should not fall into the dirt when it is disconnected.

10. Bleed the hydraulic system as outlined under Bleeding The Hydra-Lectric Control.

KEEP HYDRAULIC RESERVOIR PROPERLY FILLED

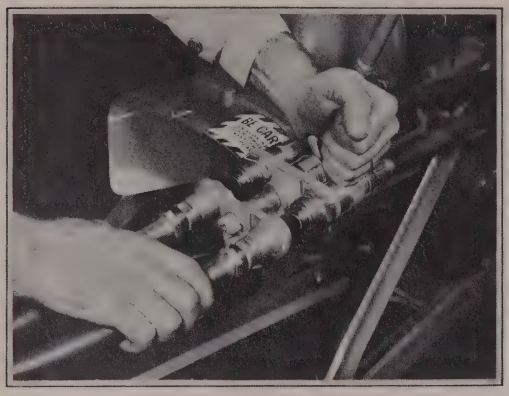


Figure 10-23 Disconnecting Breakaway Coupling

The Hydra-Lectric Control may be converted for operating mounted implements by reversing the above procedure, except for disconnecting the breakaway. To do this, press the latch on the breakaway frame toward the drawn implement and the frame will automaticaaly disconnect. (See Figure 10-23.)

ELECTRICAL SYSTEM

The Hydra-Lectric Control is equipped with an electrical system that is completely independent of the tractor lighting and ignition systems. The wiring harness contains the required number of wires to properly connect the system. If at any time one or more wires should fail in the harness, the complete harness must be replaced.

The wiring harness connectors have four terminals. One terminal is offset making it difficult to connect the male and female econnectors incorrectly. In addition, each connector is provided with a raised teardrop shaped signal. By holding the signals in alignment, the connectors may be readily assembled.

The plug connector installed in the reservoir cover connects the cylinders to the electrical mechanism inside the reservoir housing. The fuse wire from the plug connector is attached to the switch. The terminals of the electrical plug at the reservoir cover are all of the same size. Therefore, to install them correctly, the plug mounting collar has the mounting screw holes offset so that the plug can be installed only one way. The wiring harnesses are correctly installed in the reservoir cover when they point toward the center of the unit.

TROUBLE SHOOTING

Trouble with the Hydra-Lectric Control may be divided into two categories, electrical and mechanical. If you are not sure of the exact nature of the difficulty, attempt to operate the Hydra-Lectric Control with the hydraulic control levers. If the unit operates satisfactorily when using these levers, the trouble is probably electrical.

Inoperative electrical circuits are usually caused by short circuits or open circuits. To determine whether a short circuit or an open circuit has occurred, check the Hydra-Lectric fuse. If this fuse is burned out, a short circuit is present. Before installing a new fuse, check the wiring harness for loose connections and bare wires. If the fuse is intact, look for an open circuit by checking the wiring harness for broken wires and improper, loose or dirty connections. We suggest that you have your Oliver serviceman inspect the Hydra-Lectric Control if the electrical or mechanical difficulty appears to be confined to the interior of the wiring harness or reservoir housing.

RELIEF VALVE BLOWS DURING CONTRACTING STROKE

1. Restrictor valves improperly adjusted - Adjust the restrictor valves as outlined under the heading Restrictor Valves in this section.

2. Self-sealing couplings improperly connected - Check the self-sealing couplings and be sure the connections are tight.

KEEP HYDRA-LECTRIC CONNECTIONS CLEAN

RELIEF VALVE BLOWS DURING EXTENDING STROKE

1. Load on cylinder too heavy - The load must not exceed 5000 pounds for a three-inch cylinder or 9400 for a four-inch cylinder.

2. Implement design does not allow complete piston stroke or implement lift restricted - Check the cylinder mounting on the implement and make sure the cylinder is permitted to travel through the entire stroke.

3. Implement lift linkage binding - Clean and straighten the lifting mechanism.

4. Self-sealing couplings improperly connected - Check the self-selaing couplings.

5. Restrictor valve stuck or foreign material blocking passageway - Remove, clean and check the restrictor valve.

RELIEF VALVE BLOWS WHEN CYLINDER IS CONTRACTED

1. Operator holding the hydraulic control lever in the *Visual Down* position after the cylinder is fully contracted - Release the hydraulic control lever when the cylinder reaches the end of its stroke.

2. Selector valve sticking - Move the hydraulic control lever into the *Visual Up* and *Visual Down* positions several times to try to eliminate the sticking action.

3. Stop collar on piston rod too close to piston rod yoke to open the *Down* switch circuit - Move the collar on the rod so that it will contact the micro switch when the cylinder is contracted.

RELIEF VALVE BLOWS WHEN CYLINDER IS EXTENDED

1. Operator holding the hydraulic control lever in the *Visual Up* position after the cylinder is fully extended - Release the control lever actuating handle when the cylinder reaches the end of its stroke.

2. Selector valve sticking - Move the hydraulic control lever into the *Visual Up* and *Visual Down* positions several times to try to eliminate the sticking action.

PUMP DOES NOT DEVELOP SUFFICIENT PRESSURE TO LIFT NORMAL LOAD

1. Insufficient oil in reservoir - Add oil to the reservoir to bring the level between the *Full* and *Low* marks on the bayonet gauge.

2. Pressure relief valve improperly seating, scored cylinders or faulty cylinder seals, selector valve spool leaking, interlock valve seals leaking, selector valve body gaskets leaking, pump scored or worn - Have your Oliver service man disassemble and repair the Hydra-Lectric Control.

OIL FOAMS OUT BREATHER

1. Oil level too high - Drain the oil so that the level is between the *Full* and *Low* marks on the bayonet gauge.

2. Oil level too low - Add oil to bring it to the proper level.

3. Wrong type of oil in reservoir - Use only a high grade of SAE 10W motor oil in reservoir.

4. Relief valve blowing - Refer to the discussions covering difficulties with the relief valve.

5. Air leak at pump intake, seals on pump drive sleeve damaged - Have the unit checked by your Oliver Dealer.

HOSES LEAK AT SWIVEL

1. Defective hose swivel - Install new hose.

OIL LEAKS AT FITTINGS.

1. Threads damaged - Install new fittings.

BREAKAWAY DISCONNECTS UNDER LOAD

1. Improper installation of the hoses on drawn implements - Clamp the hoses in the hose support so that they cannot swing freely behind the breakaway coupling.

2. Tractor operating on rough ground - Clamp the hoses in the hose support on drawn implement so that the slack in the hoses between the breakaway and hose support is not great enough to allow them to swing freely.

CYLINDER ROD BENT

1. Implement does not allow complete piston stroke - Check and adjust the implement so that the cylinder rod is allowed to completely extend.

2. Interference or binding between cylinder yoke and implement bracket - Be sure the cylinder is properly installed and that all parts or the moving mechanism are free. Grind or file away all interference.

3. Binding in the lift mechanism of the implement - Straighten and lubricate the lift mechanism of the implement.

LOSS OF OIL FROM RESERVOIR

1. Fitting leaking - Replace fittings.

2. Seal at pump mounting flange leaking, pump oil seals leaking, pump center plate cracked - Have your Oliver service man check and repair the Hydra-Lectric Control.

BLACK OIL IN RESERVOIR

1. Transmission oil entering at pump seals, transmission oil entering the pump intake port - Have the Hydra-Lectric Control repaired.

HYDRAULIC CONTROL

The Hydraulic Control on Oliver Super 77 and 88 tractors is practically identical to the Hydra-Lectric Control except it does not include the electrical system and it is only available with a three-inch cylinder. (See Figure 10-24.) Since the electrical system is omitted from the Hydraulic Control, the cylinders also differ from those used on the Hydra-Lectric Control. Consequently, with the exception of the cylinders, all parts of the Hydra-Lectric and Hydraulic Control are completely interchangeable.

OPERATION

The selector valves inside of the reservoir housing, which directs the flow of oil to the cylinders, are maintained in the neutral position by coil springs.

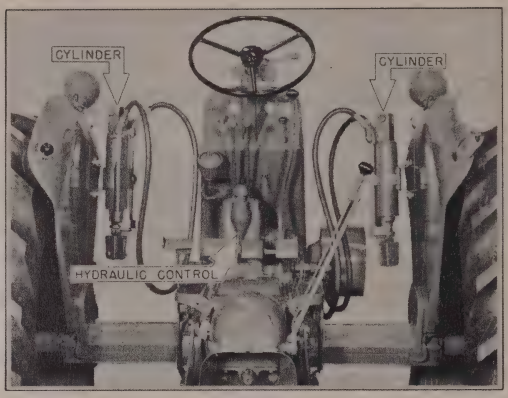


Figure 10-24 Hydraulic Control

When the hydraulic hand levers are held in the *Up* or *Down* position, these selector valves are displaced, causing the oil from the hydraulic pump to be forced into either the base or rod end of the cylinders. When the control levers are released, the coil type centering springs return the selector valves and control levers to the neutral position.

RAISING THE IMPLEMENT

To extend the cylinder and raise the implement, move the hydraulic control lever into the *Up* position by pushing it forward. (See Figure 10-25.) Hold the lever in this position until the implement has reached the desired height or until the piston in the cylinder reaches the end of its stroke. If the piston is allowed to travel to the limits of the cylinder, the pressure relief valve will open and a buzzing sound will be heard. When the operator hears this sound, he should immediately release the hydraulic control lever and allow it to automatically return to the neutral position. The cylinder will then remain locked in the extended position until the hydraulic control lever is moved to the *Down* position.

LOWERING THE IMPLEMENT

To lower the implement, move the hydraulic control lever to the *Down* position by pulling it back toward the tractor seat. (See Figure 10-25.) Hold the lever until the desired implement working depth is obtained or until the stop on the piston rod contacts the small plunger rod in the end of the cylinder. When the stop contacts the plunger, the flow of oil is shut off, causing the pressure relief valve to open.

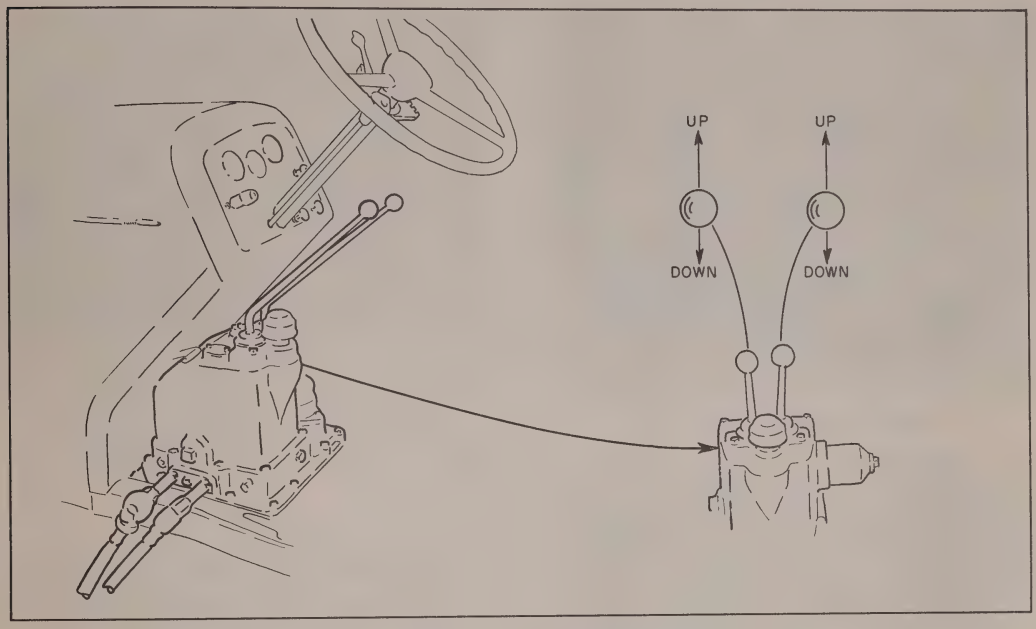


Figure 10-25 Hydraulic Control Operation

SETTING AUTOMATIC DEPTH CONTROL

Each cylinder for the Hydraulic Control is equipped with an adjustable stop on the piston rod. (See Figure 10-26.) It is this stop that controls the maximum depth to which an implement is allowed to lower. As the implement is lowered, the stop contacts a plunger projecting from the end of the cylinder and forces it in. This plunger closes a poppet type valve in the base of the cylinder and stops the flow of oil. When the oil from the base end of the cylinder is shut off, the pump builds up pressure which causes the pressure relief valve to open.

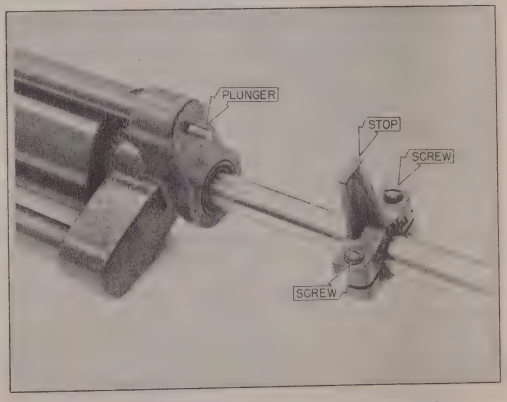


Figure 10-26 Hydraulic Control Cylinder Stop Adjustment

The stop on the piston rod is adjustable and may be moved to any position on the piston rod. From this preselected position, the working depth of the implement may be decreased in small increments by nudging the hydraulic control levers into the *Up* position. To increase the implement working depth from this preselected position, it is necessary for the operator to reset the adjustable stop. To adjust the stop, loosen the two screws and slide the stop to the desired position on the piston rod. When the stop is in the correct location on the rod to give the required maximum lowering of the implement, lock it on the rod by tightening the two machine screws with a screw driver.

SERVICING AND ADJUSTING HYDRAULIC CONTROL

For a complete discussion on servicing and adjusting

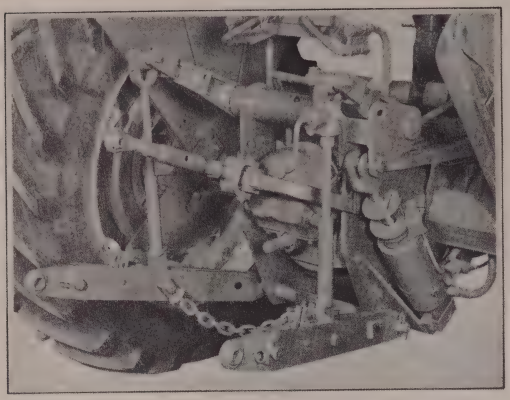


Figure 10-27 Three-Point Hitch

the Hydraulic Control, refer to the various headings under Hydra-Lectric Control. Each of the discussions may be applied to the Hydraulic Control providing you disregard all references to the electrical system.

THREE-POINT HITCH

The hydraulically operated, positive lift three-point hitch is available as optional equipment on Row Crop and Standard Super 77 and 88 tractors. This hitch is mounted on the rear of the tractor in place of the conventional drawbar assembly. (See Figure 10-27.) It is designed to provide hydraulic control for raising, lowering and adjusting rear mounted implements. Since the three-point hitch is hydraulically operated, the tractor must be equipped with either a Hydra-Lectric or a Hydraulic Control unit and a three-inch cylinder for light weight equipment such as a two bottom plow or a seven-foot tandem disc. If heavier implements are used with a weight equivalent to or greater than a three bottom plow, a four-inch cylinder must be used in combination with a Hydra-Lectric Control unit. If a three-inch Hydra-Lectric cylinder is used, the cylinder cable support bracket must be shortened to provide clearance.

The three-point hitch is of all steel construction. It is adequately reinforced and specially heat treated, where necessary, to withstand the heavy loads and occasional severe shock encountered with many rear mounted implements.

The leveling screws of the lift link assemblies are provided with a groove above the threaded ends which may be used as a guide to determine when the two links are adjusted to equal or varying lengths.

On tractors equipped with the three-point hitch, spacers should be installed between the wheel guard and the wheel guard mounting flange of the right-hand rear axle carrier. This permits the wheel guard to be installed on the inside of the mounting flange which allows the rear wheel tread to be decreased so that the right rear wheel may be moved in to locate it in the proper relation to a rear mounted implement.

The lower links are provided with adapter bushings so that the hitch may be used with implements having either 7/8 inch or 1-1/8 inch attaching pins. (See Figure 10-37.)

NOTE

KEEP THE THREE-POINT HITCH TO REAR FRAME MOUNTING CAP SCREWS TIGHT. PERIODICALLY CHECK AND TIGHTEN THE UPPER TWO SCREWS ON EACH SIDE TO 140 FOOT POUNDS TORQUE AND LOWER TWO SCREWS TO 230 FOOT POUNDS TORQUE.

ATTACHING IMPLEMENTS

To attach a rear mounted implement to the three-point hitch, back the tractor so that the lower link ends are just past the ends of the implement attaching bar. Raise or lower the hitch, as required, so that the ball joint ends are just below the implement bar. Unlatch the ball joint ends by pushing the latch forward and slip the ball joint over the implement then install the linch pins. (See Figure 10-28.) Raise the implement with the three-point hitch so that the lower link ends will become locked in position.

The lower link ends can be made free floating for hooking to wide implements with supporting gauge wheels. This is done by removing the latch pin, lowering the latch and reinstalling the pin in the upper hole in the latch. (See Figure 10-28.) Then, when the lower link end is latched, each link end will be free to float upward about two inches independent of the other link as the implement travels over the ground.

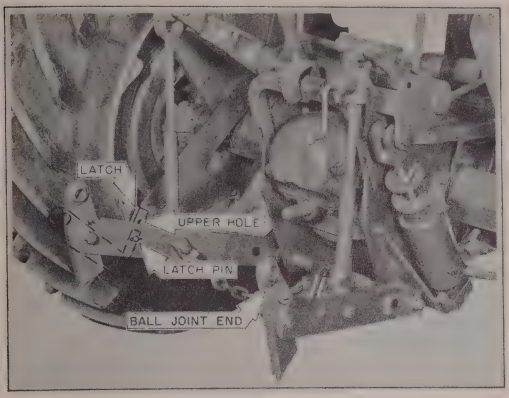


Figure 10-28 Attaching An Implement

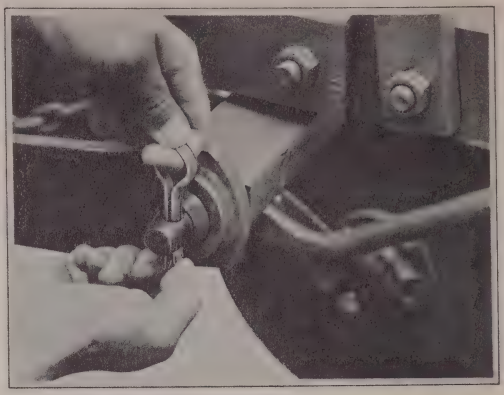


Figure 10-29 Removing Linch Pin

To remove the linch pins, squeeze the two ends together with one hand to free the locking offset from the linch pin hole and pull the pin from the hitch with the other hand. (See Figure 10-29.)

ADJUSTMENTS

LEVELING ADJUSTMENT

The leveling crank of the right lifting link assembly is used to either level or tilt the implement sideways. (See Figure 10-30.) Turning the crank in a clockwise direction shortens the lifting link assembly and raises the right side of the implement. Turning the crank counterclockwise lengthens the assembly and lowers the right side of the implement. This adjustment is within easy reach of the operator on the tractor seat and the plow or other rear mounted implement may be leveled or tilted while the tractor is in motion. The lifting link shaft is provided with 5-1/2 inches of threads which allow a total leveling adjustment of approximately 4 inches.

To adjust the length of the left lifting link assembly, remove the pin attaching the shaft to the knuckle at the rocker lift arm and turn the shaft in or out of the lifting link end as required and reinstall the pin. (See Figure 10-30.)

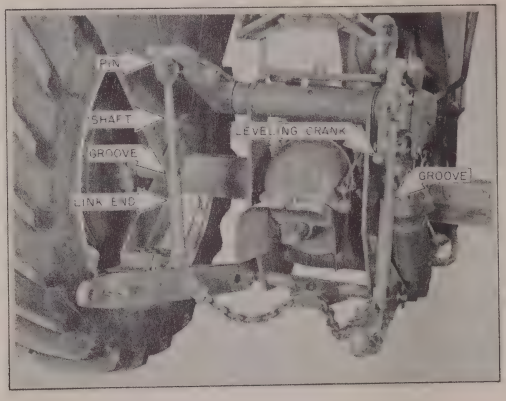


Figure 10-30 Leveling Adjustments

NOTE

USE CAUTION WHEN LENGTHENING THE LIFTING LINK ASSEMBLY WHEN A HEAVY REAR MOUNTED IMPLEMENT IS ATTACHED. EXCESSIVE LENGTHENING OF THE LIFTING LINK ASSEMBLY WILL REDUCE THE THREAD ENGAGEMENT BETWEEN THE LIFTING LINK END AND THE LIFTING LINK SHAFT WHICH MAY RESULT IN STRIPPED THREADS AND DAMAGED PARTS. NO MORE THAN ONE INCH OF THREADS SHOULD BE ALLOWED TO SHOW ABOVE LIFTING LINK END.

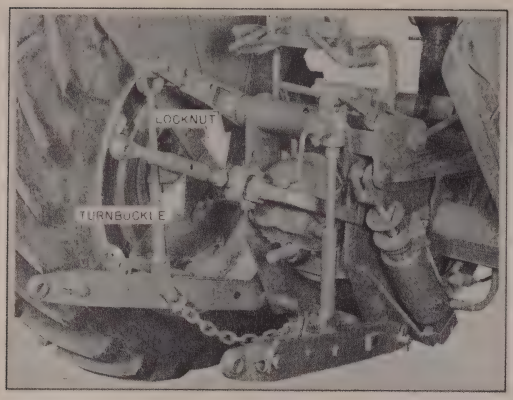


Figure 10-31 Turnbuckle Adjustment

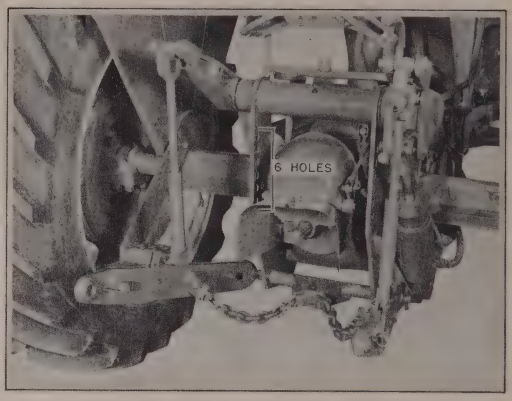


Figure 10-33 Upper Link Adjustment Holes

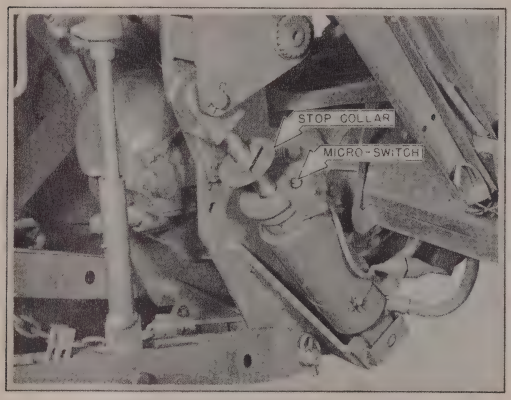


Figure 10-32 Cylinder Adjustment

TURNBUCKLE ADJUSTMENT

The turnbuckle is provided on the three-point hitch for moving the upper hitch point of the implement either forward or backward to level the attached implement. (See Figure 10-31.)

CYLINDER DEPTH ADJUSTMENT

When the three-point hitch is used with an implement that is not equipped with a gauge wheel, the working depth may be varied by changing the location of the stop on the cylinder rod. (See Figure 10-32.)

DRAFT ADJUSTMENT

The Oliver three-point hitch on the Super 77 and 88 tractors has an added adjustment of six positions for controlling implements in either extremely hard, normal or soft soil conditions. This adjustment consists of raising or lowering the upper link assembly on the hitch side plates so that the implement will operate as close to the correct line of draft as possible to provide better performance and easier control of the implement. (See Figure 10-33.) For hard soils, raise the upper link and for soft soils lower the upper link.

OPERATION

GENERAL

The Oliver three-point hitch is operated by the hydraulic system installed on the tractor. By placing the hand control lever on the Hydra-Lectric Control into the *Up, Down, Visual Up* and *Visual Down* or the hand control lever on the Hydraulic Control in the *Up* and *Down* positions, the three-point hitch will raise, lower or change the working depth of rear mounted implement. For a complete discussion on the operation of the Hydra-Lectric or Hydraulic Control, refer to their respective headings in this section.

BE CAREFUL THAT LOWER LINKS DO NOT DROP WHILE UNHITCHING

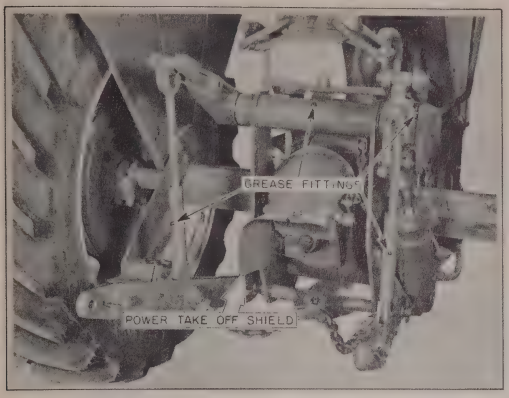


Figure 10-34 Three-Point Hitch Lubrication

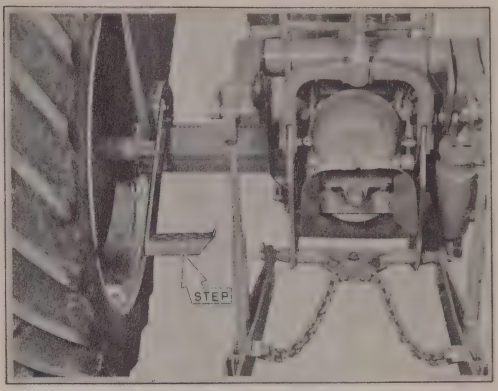


Figure 10-35 Three-Point Hitch Rear Step

When a rear mounted soil working implement, such as the plow, is properly attached and adjusted, it penetrates the ground quickly as it is lowered. This "quick entering" characteristic is the result of designing the hitch so that it tilts the plow well forward when it is raised. As the plow is lowered, it gradually levels itself until it is completely level when it reaches the adjusted working depth.

When a tractor equipped with a three-point hitch is used with implements that penetrate the ground to extremes, it may be necessary to remove the power take-off shield, Removal of this shield is necessary because the upper link yoke will strike and damage the shield. However, the shield must be reinstalled when the power take-off is used. (See Figure 10-34.)

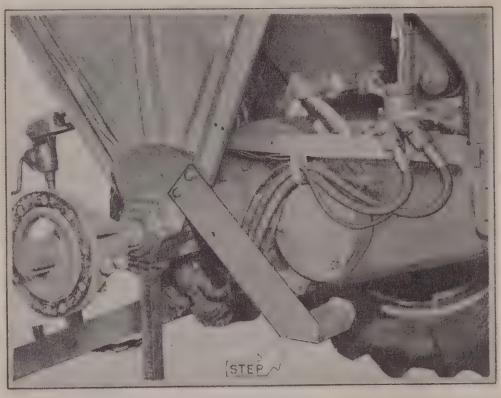


Figure 10-36 Three-Point Hitch Front Step

LUBRICATION

The Super 77 and 88 three-point hitch is provided with four grease fittings for periodic lubrication with pressure gun grease. (See Figure 10-34.) These fittings are located on the lifting link ends, rocker support tube, and the leveling crank housing. Lubricate all fittings daily or every ten hours of three-point hitch operation with the exception of the leveling crank assembly which will normally require lubrication weekly or every 60 hours of hitch operation.

THREE-POINT HITCH ATTACHMENTS

STEP

The step furnished with the three-point hitch may be attached to either the left rear wheel guard mounting flange with cap screws and nuts or to the right wheel guard mounting flange with two cap screws. (See Figures 10-35 and 10-36.)

The step may be installed in a raised or lowered position to provide the required crop clearance by installing the cap screws in the proper set of mounting holes in the step bracket.

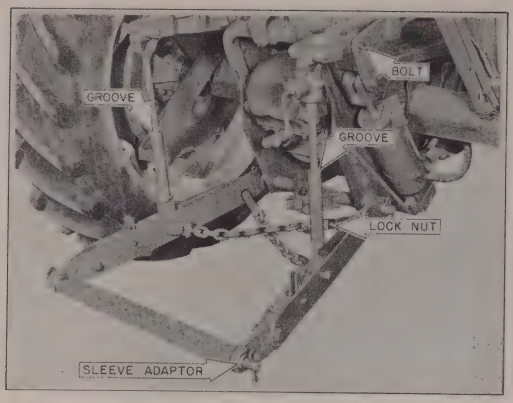


Figure 10-37 Three-Point Hitch Drawbar

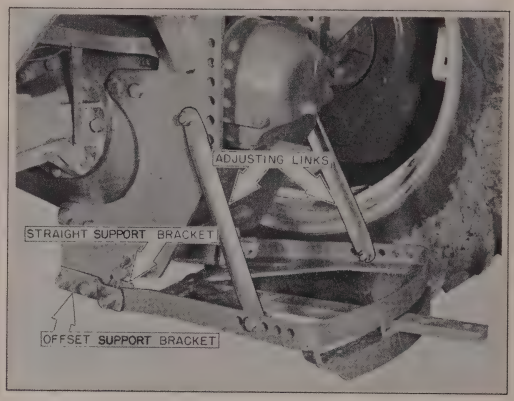


Figure 10-38 Three-Point Hitch With Swinging Drawbar

THREE-POINT HITCH DRAWBAR

When it is desired to pull drawn implements with the three-point hitch a special drawbar is available which may be quickly and easily installed on the lower links. (See Figure 10-37.) This drawbar is provided with nine holes which allow a total horizontal adjustment of seventeen inches. When the drawbar is installed a 1/2 x 4-1/4 inch cap screw, lock washer and nut should be installed through the right-hand lift arm and the cylinder bracket to lock out the free-floating feature of the hitch and the adapter bushings must be installed in the lower links. Also, the stabilizer chains should be installed as outlined under Stabilizers. The drawbar height may then be hydraulically adjusted from two inches above the ground and upward.

WARNING

DO NOT ATTEMPT TO PULL LOADS WITH THE DRAWBAR HIGHER THAN 17 INCHES ABOVE THE GROUND AS OVERTURNING THE TRACTOR MAY RESULT.

STABILIZERS

On three-point hitch applications where excessive side draft is encountered, the stabilizer chains can be crossed and attached to the opposite lower links. (See Figure 10-37.) These chains should be adjusted so there is little to no slack, but not to the point where they are under tension.

SWINGING DRAWBAR

The regular swinging drawbar and brackets, provided, with tractors not equipped with a three-point hitch, can be installed on the side plates of the hitch as outlined below. When the drawbar is installed in this manner, it is adjustable from 12 to 17 inches above the ground. Refer to Drawbar Assembly discussion in Section I.

1. Install an inner and outer lower support bracket on the three-point hitch side plates with four 3/4 - 10 x 2 inch hex head cap screws, 3/4 - 10 inch nuts and lock washers. Install the offset bracket on the outside of the plate and the straight bracket on the inside of the plate. (See Figure 10-38.)

2. Secure the ends of the drawbar support to the brackets with two 5/8 - 10 x 3 inch cap screws and four nuts. Install one nut on the cap screw until it contacts the bracket. Lock this nut in place with a second nut. A lock washer and one nut is not sufficient. Do not overtighten the first nut as it will collapse or distort the mounting brackets.

3. Attach the drawbar adjusting links to the single 5/8 inch hole in the three-point hitch side plates in front of the upper link adjusting holes with the two 5/8 - 18 x 1-3/4 inch hex head cap

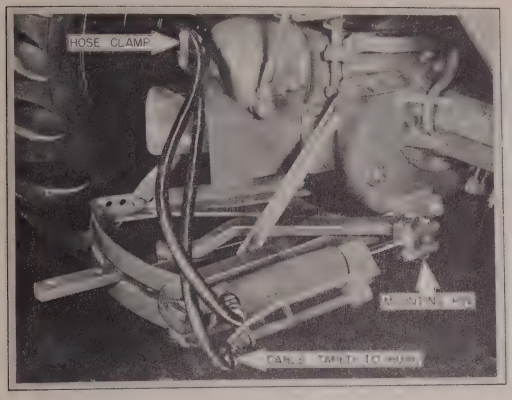


Figure 10-39 Hydraulic Side Hill Hitch

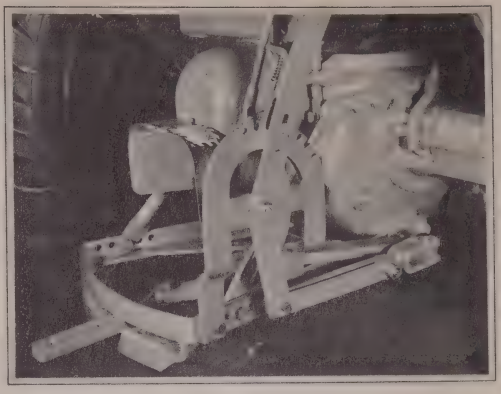


Figure 10-40 Mechanical Side Hill Hitch

screws, nuts and lock washers. (See Figure 10-38.) Installing the adjusting links in this manner allows the drawbar to be adjusted within the ASAE and SAE standards.

SIDE HILL HITCH

A hydraulic and a mechanical side hill hitch are available as optional equipment for your tractor. (See Figures 10-39 and 10-40.) Only the hydraulic hitch will work on Industrial tractors.

The side hill hitch provides the operator with a means for adjusting the horizontal position of the drawbar without dismounting from the tractor or stopping its forward motion. Its greatest application is in tractor operations where the slope of the land is constantly changing and frequent drawbar adjustments are necessary to maintain the implement in its correct position behind the tractor.

The hydraulic side hill hitch is operated by the left-hand cylinder of the tractor hydraulic system. This leaves the right-hand cylinder free to be installed on hydraulically operated drawn implements. The mechanical side hill hitch is operated by a manual control lever to the right and to the rear of the tractor seat.

To change the horizontal position of the drawbar on tractors equipped with the hydraulic side hill hitch and Hydra-Lectric Control, momentarily move the hydraulic control lever into the *Visual Up* or *Visual Down* position. The position of the drawbar is changed on tractors equipped with the Hydraulic Control by nudging the hydraulic control lever into the *Up* or *Down* position. On tractors equipped with the mechanical side hill hitch, the drawbar may be locked in several positions to the right or left of its center position by moving the manual control lever forward or backward on the sector.

NEVER STAND BETWEEN THE TRACTOR AND DRAWN

IMPLEMENT WHILE HITCHING

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MEMORANDUM

MEMORANDUM

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